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ON A RARE FORM OF PRIMARY OPACITY (*TRANSVERSE CALCAREOUS FILM**) OF THE CORNEA.†

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THE disease referred to in this paper has long been known to surgeons, and is mentioned in most of the modern systematic works on diseases of the eye. A certain number of cases and observations upon the subject (some of them with excellent descriptions and plates) have been published from time to time, but for the most part observers do not seem to have thought it worth while to record their cases in detail. The disease is a rare one, generally very unobtrusive until well advanced, and it occurs for the most part in elderly people; facts which have led to its being often looked on mainly as a curiosity. The first case that I had the opportunity of observing in detail was at Moorfields in 1873, and I have to thank Mr. Hutchinson for allowing me to use the notes of this and of two other cases which have come under his care more lately (Cases 3, 4 and 5.)

The occurrence quite lately of two good examples of it among my patients at the South London Ophthalmic Hospital, led me to examine previously recorded cases and accounts of the disease, and with the result of finding that the subject, although a very small one, appeared to have points of general interest which had not hitherto been suf-

* This disease has received various names, *i. e.*, Symmetrical Opacity of Cornea, Transverse Opacity, Ribbon-shaped and Girdle-shaped Opacity, Calcareous Film of Cornea.

† This paper was read before the Medico-Chirurgical Society of London, April 19, 1879.

ficiently dwelt upon, in addition to being an affair of some local importance to the eye itself.

In this malady *the exposed part* of the cornea is slowly invaded in a nearly transverse direction beneath the epithelium, by a patch, or two patches, of superficial opacity, oblong or oval in shape, and so opaque when fully formed as quite to hide the corresponding parts of the iris and pupil. The opacity can be scraped or chipped off, and is composed of minute crystals, chiefly calcareous. There is never the least trace of ulceration, nor does the corneal epithelium as a rule show any change, either in smoothness, transparency or general level. The limits of the opacity are well defined, usually, indeed, quite abrupt, and the rest of the cornea is perfectly clear. Sometimes there is a history that the eyes have been irritable, but seldom of liability to any special form of ophthalmia or to corneal ulceration. In some chronic glaucoma has come on, but the majority have remained for many years free from complications.

The disease generally begins on one cornea before the other, but always becomes symmetrical in the end.

Before going into further detail I will give the notes of the cases (five in number) which have been referred to.

Case 1.—Wm. Webster, formerly a traveller, but for the last 25 years a private coachman. Tall, sallow, lean, temperate, hair dark gray; in good health; of nervous temperament. Teeth a good deal worn but tolerably good; is not a great meat-eater. For many years liable to occasional attacks of gout in the great toes and knees, and had an attack in the *R.* knee while under care for his eyes, having previously had no attack for eight years. No syphilis. His mother had "a sort of gout" in her fingers. His urine is never thick. He sweats freely. Radial artery decidedly rigid.

At æt. 57, *R.* eye began to fail. Had no material pain at any time.

Æt. 63 (September, 1877), admitted to South London Ophthalmic Hospital for slight ciliary congestion and tenderness of *L.* eye, which, having hitherto been as he thought quite perfect, had lately begun to get dim. Conditions now symmetrical but rather more advanced in *R.* eye, (See Fig. 1).

An oval patch or stripe of gray-brown opacity runs almost horizontally across each cornea. The inner end of the oval is the broader; the lower border of the patch curves downwards and is abruptly defined, the upper border is nearly straight and its outline rather softened; the patch terminates at each end 2 *mm.* (more or less) from the border of the cornea; the unaffected marginal part, as well as the upper and lower portions, being perfectly clear. The epithelium over the opacity appears quite healthy and its level is not altered. At the centre of each stripe is a sinuous crack running almost vertically and with some little ones branching off from it, like cracks in china glaze. When magnified, one or two dark dots are seen on the patch, and it is then seen also that the opacity just bordering the cracks is whiter than elsewhere. The entire stripe is situated rather below the horizontal diameter of the cornea, and inclined from within outwards and a little downwards. In the *L.* eye the upper part of the pupil is still uncovered. *Sight:* *R.* eye counts fingers at 12″; *L.* reads Jager 6 fairly at same distance with + $\frac{1}{12}$.

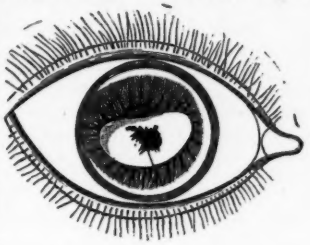

FIG. 1.

No definite complications. Pupils small and very active; the *R.* never dilated widely to atropine though there was no trace of iritis. Tn. in each. The tenderness and ciliary congestion of the *L.* eye soon passed off under local treatment and the administration of some iodide and colchicum. Well-marked arcus senilis.

Treatment of the opacity. In *R.* eye the central part of the opacity was scraped off in two sittings and sight raised thereby from counting fingers to reading Jager 10 fairly well at 12″ with + $\frac{1}{12}$, (it was now found that there was some cortical cataract). In the *L.* eye dilute nitric acid was applied, with the point of a camel's hair brush, several times to the centre of the opacity, a carbonate of soda solution being applied almost immediately after each touch with the acid brush. The acid brush, while in contact, caused brisk effervescence and considerable smarting. The color of the spot acted on changed from brownish to white; it did not clear afterwards, but no harm was done.

I examined the scrapings from the *R.* cornea with results which were in close agreement with the published accounts by Mr. Dixon

and Mr. Bowman. The material consisted, besides portions of healthy epithelium, of small white thin chips. These were formed by a layer, or rather several layers, of small highly refracting granules, sometimes in the form of short thick rods, but often seen endwise, and then appearing to be round; some were almost dumb-bell shaped. The granules dissolved quickly with effervescence in weak nitric acid, and slowly, without bubbles, in tartaric acid (exactly as in Mr. Bowman's case). After the action of the acids, the position of each granule was faintly visible as a mark of corresponding size and shape, representing either an organic matrix or a little depression on the epithelium into which the granule had fitted. The granules were arranged in a sort of network, with small irregular meshes and thick walls. In one of the fragments a minute mulberry mass was found, each nodule of which seemed to consist of radiating crystals.

A month after the operation, the eye being quiet, it was noted that the cleared space remained quite free; but on careful examination the portion of cornea exposed was found to be not perfectly clear, a very finely granular haze being perceptible when magnified.

Four months after operation (January, 1878) the condition was the same; the space cleared remaining clear and sharply defined (Fig. 1), and the cornea exposed thereby appearing at first sight perfectly transparent, but when examined by focal light and a magnifying glass showing a very slight haziness, apparently superficial.

The opacity on the *Left* cornea, which was touched with acid three months ago, looked exactly the same both in color, density and size, as before the acid treatment, and I accordingly scraped off a part opposite the lower part of the pupil, and probably below the spot to which the acid had been applied. It is as yet (January 9th) too soon to tell the effect on sight in this eye.

The chips from this eye presented the same general characters as described in the right eye. In the present specimen, however, it was evident that many, if not most, of the granules had become confluent, and that minute conglomerate masses had so been formed. Here and there also, when the chips were broken up, separate rounded crystals of much larger size were found. The network arrangement was not noticeable in this specimen, probably because the film was too thick. The granules varied in size from mere dots, barely visible under a power of 400 diameters, up-

wards, but the vast majority were of a nearly uniform and intermediate size, about $\frac{1}{1000}''$ or $\frac{1}{3000}''$ in diameter.

March, 1879.—Conditions as at last noted. The cleared patch on each cornea remains as clear as before, indeed, if anything, rather clearer, and the broken borders of the film which surround the clearing are as abrupt and sharp as they were directly after operation. No change has taken place in the size of the patches, nor have any other symptoms occurred except occasional irritability of the eyes. Sight as before.

Case 2.—Sarah Lasseter, unmarried, a needle woman in comfortable circumstances. Since the age of 12 months her *L.* lower limb has been paralysed and is now wasted. At about 25 she rather quickly lost all her scalp hair and has ever since worn a wig; the eyebrows are thin but not altogether wanting; the eyelashes are good. She was about the middle child in a family of eleven; two brothers and a sister died of "decline," and several others died young. Mother died of cancer on the breast. Father suffered severely from gout in his feet; one niece of the patient is known to have had rheumatic fever. The patient herself has never had a trace of either articular or fascial rheumatism, nor of gout, and is not liable to deposit of lithates in her urine. She is pale and nervous. Teeth large and for the most part sound. She prespires very freely from slight exertion.

At about æt. 27, (two years or so after the alopecia) she began to be liable to relapsing iritis, the attacks being attended with great pain. They occurred at intervals till she was about 40, and then ceased, both eyes being affected, but sight not being materially damaged, so that she was still able to make her living as before. At about the age of 40 she began to use a pink ointment for her eyes, putting it inside the lids as well as to the eyelashes, and using it on and off until I saw her. Her reason for using it was that it "cleared the sight," though as above stated she was at all times able to do her work. I do not attach any importance to this ointment in the history of the case, but mention it because such things have been supposed by some to account for the disease under notice.

She dated the definite failure of sight from about æt. 49 (three years before admission), and had found the dimness increasing still more quickly for the last four or five months. She would not admit that the eyes had ever been irritable or weak since the ces-

sation of the iritic attacks. There was nothing in the history to show whether the opacity began sooner on one eye than the other.

Æt. 52 admitted (September, 1877). Conditions symmetrical. A narrow oval of grayish brown superficial opacity, covered by healthy epithelium across the cornea. It is nearly, but not quite, horizontal, sloping rather downwards as well as outwards, and as a whole is situated below the horizontal diameter of the cornea. Each end of the stripe stops considerably short of the corneal margin; the inner end is broader than the outer; the lower border sharply defined, the upper border rather shaded off. In certain lights the opacity is slightly iridescent like the phosphatic film on urine, when magnified it looks like fine sand beneath the epithelium. It is slightly larger on the *R.* eye than on the *L.* In both eyes, old, white iritic adhesions; most in the *L.*, where they allow very little dilation by atropine, but in the *R.* the pupil dilates enough for ophthalmoscopic examination, and the fundus appears healthy. (In the *L.* also after operation the fundus was visible and healthy.) Sight, Jaeger 8 with each eye, but better with the *R.*; she saw better by shading her eyes.

Treatment in each: The central part of the opacity was scraped off and an artificial pupil made downwards and inwards, at separate sittings. Irritability, lasting for some weeks, followed the operations. When discharged six weeks after, the eyes were nearly quiet but sight just as before, not improved; and she still preferred to shade her eyes when reading. I have seen her several times since and found the condition of the corneæ always the same. She considers that the operations have made her sight worse. The microscopical and chemical characters of the particles in this case were almost identical with those of Case 1, and need not therefore be repeated. But a few additional points were noticed; thus when examined in water the regularity with which the granules were arranged was very striking. They were found to be almost all either rod or dumb-bell shaped. After the majority of the smaller granules had been dissolved by a few seconds' immersion in weak tartaric acid, a moderate number of larger rods and a few larger globules were seen. The film in this specimen was thinner and the granules on the average smaller, than in Case 1.

Case 3.—Samuel Spiers (Mr. Hutchinson's patient at Moorfields), steel and copper engraver; uses only graving tools, no

acids. He has slight chronic rheumatism but no gout, nor, so far as his meagre knowledge goes, does there appear to be any gout in the family. A lean man, with nearly white hair, the only survivor of his father's children, æt. about 43. The *L.* eye began to get dim. It was the eye which, with a magnifying glass, he used for his work. After some years the dimness increased so much that he was obliged to change over to the *R.* eye.

Æt. about 61, *R.* eye began to fail. No material pain or irritability in either eye at any time.

Æt. 64, admitted (1873). *L.* eye shows an oval patch of grayish opacity across the cornea, but not reaching quite to the border of either end; the lower border of the patch curved downwards and exactly fitting to the border of the lower lid when he looks at a new object; upper border less curved. Epithelium smooth and bright. Some densely white dots visible in the opacity when magnified.

The *R.* cornea shows a similar patch but confined to the inner part; it begins a little within the corneal border, to which its inner boundary runs parallel, and extends in an oblong form towards the centre, partly covering the pupil. The opacity is most dense at its nasal end and thins away rather gradually over the pupil. Uses this eye for his work.

No complications. Pupils act fully to atropine, and there is no trace of iritis. Tension normal. A considerable *arcus senilis* above and below, but not extending to the sides, so that at the sides a narrow border of *clear* cornea separates the sclero-corneal junction from the commencement of that transverse opacity. Advised to have the opacity in the *L.* eye scraped, but was prevented by illness (bronchitis and feeble health) from attending regularly, and nothing was done.

Æt. 68 (Oct., 1877). The opacity on the *L.* has not increased. In the *R.* it has extended a very little, but still leaves part of the pupil uncovered, and there is no patch on the outer part. With his $+\frac{1}{10}$ can manage to read Jaeger 6 or 8 at about 12″. Is infirm, but intelligent and cheerful.

CASE 4.—*Transverse superficial opacity of apparently similar character on one eye only. Duration uncertain. Failure of sight in both eyes from choroidal disease at yellow-spot regions. Incipient cataracts. Disease of vitreous. No iritis. Health history incomplete.*

Wm. Warwick, shoemaker, came to Moorfields in August, 1877, for failure of sight in both eyes of about eighteen months' duration. He was 78 years old, in good health, hair nearly white, had lost most of his teeth, intelligent and cheerful. Vision=only 20 Jaeger with difficulty with each eye. Pupils fairly active, but neither of them quite round; *R.* rather larger than *L.*; they dilated well to atrophine.

The corneal disease is limited to the *R.* eye; there is no trace of it in the *L.*

In the *R.* there is a sole-shaped band of brownish-gray opacity nearly transverse, but sloping downwards from within outwards, and occupying the central region of the cornea; its two ends lie considerably within the border of the cornea. It is densest at the centre, and shades off rather gradually at its borders, which are nowhere sharply defined. When magnified it looks somewhat stippled. The epithelium covering the opacity is smooth and bright. The patient said that in former years this eye had been liable to be watery and weak, but no other facts transpired to throw light on the want of symmetry.

There were other important changes in *both* eyes to which the failure of sight was due. In each there was incipient cortical cataract, in the form of short striæ with some dots and specks; this was rather more advanced in the eye with the corneal opacity. There was a large area of superficial disease of choroid at the yellow-spot region in each eye, consisting in disturbance of the pigment epithelium, its removal from numerous small spots and accumulation in little dots, lines, etc., in the intervals. No choroidal disease elsewhere, except a narrow belt of partial atrophy around the disk. Disks had a rather brownish tinge, but were not hazy; retinal vessels of normal size. In the *L.* eye (in which the cornea is clear) a large, glistening, tendinous-looking opacity in the vitreous, directly in the line of the disk and rather far forwards. The corneal opacity in the *R.* prevented so detailed an ophthalmoscopic examination in it as in the *L.* Refraction emmetropic.

I saw the patient only once, and made no enquiries as to his constitutional tendencies.

Case 5.—James Broadbridge, a small rather plump-featured old man, now aged 77; was formerly a bath proprietor but failed, and of late years has not been in such comfortable circumstances;

now does a little gardening. Considers that he has had good health. Has healthy grown-up children. No history or evidence of gout whatever in the patient, nor so far as he knows in his relatives. Has always been very moderate, even abstemious, in food and drink. He has always perspired very freely. Believes he does not sleep with his eyelids open. History of onset of corneal disease somewhat indefinite, but he believes his sight to have been perfect till about æt. 65, when it began to get dim. At about æt. 71 or 72 he had a slight attack of inflammation in the *L.* eye, for which he was treated by a chemist and was soon well; he describes some redness, and especially grittiness, "as if he had got some dirt" into the eye. This was the only attack of definite symptoms of which he had any recollection, and the *R.* eye did not suffer at all from such symptoms.

At æt. 73 (Nov., 1873), a year or more after the above occurrence, he came to Mr. Hutchinson at Moorfields on account of the slight impediment to vision caused by the opacities, and has attended occasionally since then. The only treatment has been a zinc lotion. A few weeks ago I saw him for the first time amongst the old cases, and Mr. Hutchinson was kind enough to let me take the case.

Present condition (Jan., 1878). Vision, with $+\frac{1}{10}$; *R.* eye reads Jaeger 4, *L.* eye 6 or 8 J.; with both together he makes out 2 J. The opacities are symmetrical but larger in the *L.* On each cornea are two patches which join one another by a narrow bridge below the pupil. In the right eye the *general* outline of the united patches is that of an oblong out of whose upper part a large piece has been taken. The inner patch, or inner part of the imperfect oblong, is by far the larger, the outer patch (or part) being in fact only comparatively narrow and crescentic. The inner patch covers about a quarter of the pupil; at this part the opacity is thinned off somewhat gradually, but everywhere else its outline is sharply defined. Several cracks, all of them bordered by white, are seen in different parts and it is noticed that they all run almost radially in respect to the centre of the cornea; one crack leads up to a small patch from which the film has separated. There are also several white radial marks without central cracks. The patch is covered by epithelium; but contrary to rule this is not perfectly smooth, but shows a considerable number of minute rounded elevations or hillocks looking like vesicles or semi-transparent beads, but not looking chalky. The patches on

the left cornea are modified, probably by ulceration occurring on their surface at the date of the inflammatory attack which has been described. They are larger, more densely opaque and much whiter, and present considerable irregularity (a sort of facetting) of the surface. The inner patch is continuous with the scleral border and several straggling vessels pass on to it for a considerable distance. When carefully examined the presence of the film can easily be detected, especially on the outer patch; and it can be seen to be broken up into distinct pieces separated by wide cracks, like broken ice. The corneal tissue beneath, however, is hazy, and thus the characters of the superficial film are less made out. Tn. Pupils round and active. Well-marked arcus senilis. Arteries not rigid.

In this disease the opacity may begin either as a single patch at the centre or at one side, or as two separate patches, one at either end of a nearly transverse diameter. When it begins centrally (as in Cases 1 and 2) the opacity spreads almost horizontally towards the margin, remaining widest at the centre; when it begins at the sides of the cornea (as in Case 5) the patches approach one another, and often coalesce more or less fully over the centre of the cornea, the centre of the combined patch remaining its narrowest and least opaque part. The length of the patch or stripe is generally rather more than twice its breadth; sometimes it is widest over the middle, tapering to each end, while in other cases it is widest towards one or other end.

The direction of the stripe is not quite horizontal, for it always slopes a little from within outwards and downwards. The larger part of the opacity is below the horizontal diameter of the cornea, and thus the lower or lower-inner half of the pupil is the first part to be covered. When the eyes are directed to some near object, as in ordinarily downward convergence, and the eyelids partly closed, the borders of the opaque stripe usually correspond with great accuracy to the edges of the lids. The opacity often comes nearer to the inner than to the outer border of the cornea (Fig. 1). The lower boundary of the stripe curves downwards, and is often more sharply defined than the upper, which is also as a rule ess curved. The upper-outer part of the pupil is the last

to be eclipsed by the spread of the opacity. The change progresses with extreme slowness, and several years often pass before the patch, even if it be central, causes much inconvenience. (There is, however, reason to suspect that in some cases it rather quickly reaches to a certain stage and then stops, or advances very slowly; on this point more information is wanted.) When fully formed it is equally opaque in all parts, but in younger specimens the newest parts of the patch allow some light to pass through. In no case has this change been seen in the parts of the cornea habitually covered by the lids, though in several cases, (Nos. 7, 11, 13, 14, 17, 18) many years, and in Case 3 as long as 20 years, had passed since the symptoms began.

The opacity never reaches quite up to the corneal border, not even when it begins by lateral patches; and a narrow rim of clear cornea may be seen bounding each end of the stripe even in the oldest cases (No. 3). It may be noted that this clear border is just the part affected by arcus senilis when complete (see Fig. 1), and is the part most under the influence of the conjunctival vessels. The opacity is of a light brownish or gray color, never white; it looks, in fact, like rather dirty ground-glass viewed from the *unground* side. Examined with a hand-lens it is minutely granular like fine sand, whilst scattered blackish dots, or white, chalky-looking specks, or fine, rather sinuous dark lines, may sometimes be seen. The dark lines are cracks in the brittle lamina through which the dark iris or pupil is seen. Mr. Dixon compares them to cracks on old varnish—just as cracks in the enamel of a teacup are edged by a border of slight staining, so the cracks in this calcareous film are edged by a narrow border of whiter color than the rest. Sometimes the opacity is slightly iridescent, like oil on water, or phosphates on urine. The disease may co-exist with *arcus senilis*.

If the epithelium is scraped off we come down to a hard, gritty layer, which, with a little pains, can be picked or tilted off in small chips, as one takes off bits of shell from an egg. The cornea beneath this crust is transparent, and if the patch so cleared be opposite to a clear pupil, good sight will

be restored as soon as the corneal epithelium has reformed. The little chips become white when dry. They were found by Mr. Bowman (Case 7) to consist microscopically of small, "rounded, highly refracting grains," closely aggregated and forming a sort of network with very thick and close meshes. The late eminent chemist, Professor Miller, of King's College, found that these granules consisted of "the same ingredients of ordinary bone, *viz.*, phosphates of lime and magnesia, with a considerable proportion of carbonate of lime;" he tested for lead, but found no trace of it. The epithelial cells in this case were quite healthy.

In Mr. Dixon's case (Case 6) the scrapings were examined by Professor Taylor, and found to consist of phosphate and carbonate of lime (in a later account of the same case Mr. Dixon says phosphate and *sulphate* of lime, but this is probably an error).

The *sensibility of the cornea* at the seat of disease is certainly not abolished, even if at all lowered. In Bowman's case the man fainted with the pain of scraping; in my own cases the operation gave quite as much pain as commonly attends the removal of a foreign body, and although in one of them I thought the surface over the opacity, before the operation was begun, less sensitive than the clear part of the same cornea, I do not feel sure that the observation was reliable.

The only important symptom in uncomplicated cases is a slowly increasing dimness of sight, commensurate with the size and position of the opacity. When the opacity begins at the centre, the patient's complaint is often the same as in early nuclear cataract, *viz.*, that he sees best in a dull light or when he shades his eyes. As has been mentioned, irritability and watering are sometimes present, but seem to be just as often absent. In an important contingent of the cases glaucoma, or iritis leading to secondary glaucoma and cataract, are found, one or other of these results being present in 7 of the 20 cases which form the basis of this paper.

The disease is so rare, and so large a number of its subjects are tolerably advanced in life when it begins,

that although curative treatment by operation is a matter of some importance for the ophthalmic surgeon, the questions relating to its cause have a much greater and more general interest. In cases where the corneal film is the only disease, and where sight is considerably impaired, the opacity should be chipped off opposite the pupil by a combination of lifting and scraping with a broad needle or a small, blunt-ended knife, such as was formerly used for enlarging the opening in the flap operation for cataract. In complicated cases iridectomy will generally be necessary, and Arlt maintains that he has extracted the opaque lens in some cases with good result.

So far as is known there seems to be no tendency for the film to form again over any part from which it has been chipped away. In Case 1 a year and a half, in Case 6 a year, and in Case 7 three years and a half are known to have elapsed without any fresh deposit on the cleared area.

In examining as to the *cause of this disease*, we must take such separate factors as seem likely to furnish information.

1. *Symmetry.*—Both eyes were affected in 14 of the 16 cases where this point is mentioned. In one of the exceptional cases (Case 4) the duration of the disease on the one eye was uncertain; in the other (Case 16) three and a half years had elapsed without the second cornea suffering. But an interval quite as long as, and sometimes much longer than, this, elapsed between the onset of the disease in the two eyes in several cases (Cases 1, 11 and 3), so that no positive conclusive inference of its even occasional asymmetry can be drawn from these two cases.

It would seem indeed that the disease always becomes symmetrical. The fact of symmetry, however, does not help us to the determination of a constitutional, as against a local, cause in this malady; since both corneæ would, under ordinary circumstances, be exposed to the same local influences.

2. *Sex* is stated in fifteen, and all except one were males.

The exception occurred in a woman who had had relapsing iritis, and showed other peculiarities.

3. The patients' approximate *age when the opacity began* is given in fourteen cases. In seven of these the patient was over 50; between 45 and 50 in three; between 30 and 45 in two; and below 30 in only one. The cases beginning early were No. 3 at about æt. 43; No. 14 at æt. 34 or 35, the patient dying at 53 of granular disease of the kidneys; and No. 13 at æt. 25, the patient's father having suffered from gout.

4. The patient's *occupation* is named in only eleven cases. No connection with the disease is traceable, unless trades predisposing to gout may be supposed to have an indirect influence. They are as follows:

Traveller in early life; afterwards coachman (Case 1).
Traveller (Case 12).
House-painter (Case 7).
Barometer-maker, but having very little to do with mercury, and never known to have been affected by it (Case 14).
Water-gilder (Case 13).
Glass-engraver (Case 8).
Steel-and copper-engraver, but using no acids (Case 3).
Bath-keeper and lately gardener (Case 5).
Cabinetmaker (Case 6).
Needlewoman (Case 2).
Shoemaker (Case 4).

5. Facts as to the *constitutional state and morbid tendencies.* Most of the patients appeared in good health when seen. Several of them are particularly stated to be thin, dry-fibred and sallow (Nos. 1, 2, 3 and 13). Only one is said to be plethoric (No. 12). There was a history of consumption in the family in Cases 2 and 14. There was a perfectly definite *history of gout*, either in the patient or his father, in four cases (Nos. 1, 2, 12 and 13); and one other patient (No. 7), though not stated to be gouty, was a painter. In

five other cases (Nos. 11, 15, 15, 18, 20), though little or nothing is mentioned as to the patient's health, there were other changes in the eyes (iritis,—glaucoma,—hemorrhagic retinitis) which are well known to be often closely associated with gout. Case 14 died with granular disease of kidneys, hypertrophy of heart, and pulmonary apoplexy, with widely diffused and abundant atheroma of arteries, at the age of 53; he had never had gout, and the *absence of* gouty changes is particularly mentioned in the post-mortem notes. In the remaining five cases (Nos. 6, 9, 10, 17, 19) there is no information as to general health.

The following facts and queries may be considered *in favor of a local cause* for this disease:

a. It never invades the parts of the cornea which are habitually covered by the lids. It generally increases till the whole of the exposed part is involved and then stops. Small irregular masses of black or brown pigment are often imbedded in the film, probably particles of dust.

b. A margin of cornea at each end of the opacity always remains free.

c. It will be worth while in future to ask whether the patients are in the habit of sleeping with their lids partly open, or whether a somewhat low degree of corneal sensibility allows them to wink less often than other people. Such pecularities would allow a freer evaporation from the cornea, and might therefore lead to an increased flow through the tissue towards the exposed region, and to the collection of any solid residue thereat. Any such tendency would, I suppose, be increased by working in hot rooms, and by habitual exposure to the wind. Such increased transudation through the exposed part need not cause the epithelium to dry, for it would still be moistened by the lids. That the crystalline film forms *beneath* the epithelium and gives rise (except in rare cases) to no change in this structure, seems equally difficult of explanation on any hypothesis; it may, perhaps, be analogous to the formation of crystalline deposits ("Cystoliths") with which I believe botanists are familiar as occuring *just beneath the surface* in some plants.

d. Is it due to a superficial *inflammatory* change leading to calcification? Note the occurrence of ciliary congestion and irritation in some cases.*

The opportunity of making sections of the diseased cornea is much wanted; the names of several of the patients are given in full at the end of this paper, and it is possible that some of them may come into the hands of our Pathological Registers.

e. Can the disease be partly explained by natural differences in the closeness or permeability of the corneal tissue, or in the thickness of its epithelium, in different persons?

In *favor of a constitutional cause: a.* Although this crystalline film forms only a part which is exposed constantly to the air, yet it takes place in so few persons that there must be some special conditions added, not only perhaps as regards unusual exposures of the vulnerable part, as above suggested; but an altered composition of the eye-fluids, and therefore probably of the blood. Such an error of composition might affect either the aqueous humor, or the nutritive fluids of the cornea; and the result might be explained by an excess, or with more likelihood by a wrong composition, of the natural lime-salts of the blood. It is extremely interesting to note in this connection that oxalate of lime is stated by Dr. Garrod to be very abundant both in the blood and *perspiration* of many gouty persons.

b. Its occurrence almost without exception in men.

c. The history of gout in one patient and in the parents of several more, and the occurrence in others of insidious iritis, glaucoma, and hemorrhagic retinitis, maladies which are well known to affect gouty persons, or gouty families, with especial frequency, *seem to point to gout, or perhaps rather to excess of uric acid in the blood*, as supplying the most likely explanation of this very peculiar corneal disease.

d. Is any corresponding (not necessarily identical) change

* It may here be mentioned that cases are sometimes seen in which diffuse inflammation of the central region of the cornea occurs, with steaminess of surface and some haze of the proper corneal tissue. I have never seen such cases excepting in adults; and have one at present under care in a rheumatic man. Such cases need further study. As a rule they are not difficult to distinguish from heredito-syphilitic keratitis.

met with in skin or mucous membrane elsewhere? Note that the cornea supplies the only well-moistened mucous surface which is constantly exposed to the air.

e. Is the disease found in any lower animals? It is of interest to bear in mind that the so-called anterior elastic lamina of the cornea, upon which the film lies, is a much better marked structure in man than in many animals.

f. In what relation does the corneal change stand to iritis and glaucoma when these occur with it? Von Graefe looked upon the corneal disease as forming the first stage of a chronic disorganizing iritis, followed by a secondary glaucoma; and in regard to the cases in which such complications have been found, this would appear to be the general (though not *invariable*) sequence of events. In a few cases *simple* subacute, or chronic, glaucoma follows the formation of the opacity, without the intervention of iritis; a fact of which Graefe was also aware (Cases 15 and 16). The natural history of the disease is as yet very incomplete. It may in the end appear that such an error of composition of the juices of the body as gives rise, under certain local conditions, to the uncomplicated crystalline film, is also an important factor in the etiology of some forms of glaucoma. Certainly the occurrence of chronic iritis and glaucoma in several genuine cases of this sub-epithelial calcareous film, seems to point to a more than accidental relation between the two.

The subject would be incomplete without some notice of certain cases which resemble the present disease in the position of the opacity, and are perhaps similar in some of the pathological processes, though in all probability differing from it essentially in cause. I allude to cases in which the corneæ of eyes which have been long blind, present a broad stripe of superficial opacity running (as in the disease already considered) across from side to side. The opacity in such cases, however, generally involves the epithelium, which, losing its smoothness and polish, becomes steamy or

pitted, or studded with little granular elevations. The opacity is also less uniform in thickness, and less defined in outline than in the true disease; in some specimens, indeed, it is quite irregular, showing many dense spots and other light spaces; it is also of white color. Microscopical sections of such corneæ have shown various changes in the epithelium, with puckering of the anterior elastic lamina, and sometimes changes in the superficial laminæ of the cornea; but I do not know that a film of calcareous particles has been found.

The changes here alluded to are found on the cornea of eyes blinded by many different causes and occur at all ages and in either sex. But it is important to note that in many of them the eye either is at the time, or probably has been, glaucomatous, either spontaneously or from injury; in some there has been cyclitis, while in others the globe is shrunken and plates of bone are found on the inner surface of the choroid. In all of them it is likely that the sensibility of the cornea has been lowered as the result of disease of the ciliary nerve, and that consequent undue exposure may have been the chief agent in bringing about the changes observed.

We must, I think, regard these cases of *roughened transverse opacity in eyes already blind*, as having a very different signification from the *smooth subepithelial incrustation of lime-salts* which forms the subject of this paper.

Goldzieher has lately described the changes in the cornea in a case of this secondary riband-shaped opacity as consisting in colloid formations in the superficial corneal layers, irregular thickening and degeneration of the epithelium and the presence of masses refracting like fat, but resisting ether, situated in the deeper layers of the cornea.—Hirschberg's *Centralbattl*, January, 1879.

LIST OF AUTHORS.

1848. Dixon. Diseases of the Eye, 3d edition, p. 114. (Case observed by Dixon in 1848, and first published by Bowman in his lectures on the Parts concerned in Operations on the Eye, 1849. Reproduced in

Dixon's work.) Case completed in British Med. Jour., 1871, i, 443.

1849. Bowman. Lectures on the Parts concerned in Operations on the Eye, p, 117. A different case from the above. Wood-cuts of the cornea before and after operation, and of the microscopical appearance of the scrapings. Case completed in Med. Times and Gazette, 1852, ii, 264. These seem to be the first two cases on record. They are quoted by many later writers. Bowman's wood-cut is reproduced in the French edition of Mackenzie's Treatise. It is singular that v. Graefe, writing in 1869 on the subject, makes no reference to them.

1852. Bowman. Med. Times and Gazette, ii, 264. A new case. Reported by Hutchinson.

1855. Haynes Walton. Med. Times and Gazette, 1855, ii, 163. A new case. From internal evidence there can be no doubt that this is the same case as Farilie Clarke's Case III in Brit. Med. Journal, 1870, ii, 380.

1869. v. Graefe. Archiv f. Ophthalmologie, xv, 3, 138. The disease considered in relation to glaucoma. Lithographic plate showing four corneæ in different stages from three cases. (Translated, excepting the descriptions of the figures) in Ophth. Hos. Reports, vii, 1.

1870. Fairlie Clarke. Transactions of Path. Soc. of London for 1869–70, p. 331. Two new cases with wood-cuts of the cornea in each.

Fairlie Clarke. Brit. Med. Journal 1870, ii, 380. The above two cases reproduced with the addition of a third new case. (See Haynes Walton, above.)

1871. Arlt. Zehender's Monatsbl. f. Augenheilk., p. 369. The subject in connection with a paper by Leber, on the filtration-power of the cornea.

Arlt, Schweigger, and Saemisch have all seen cases.

1872. G. Obertüschen. Inaugural Dissertation. "Ueber Band-keratitis." Bonn, July 23, pp. 26. Four new cases given with great brevity; two of them had been for some time previously under the notice of Dr. Saemisch.

1873. Landesberg. Archives of Ophthalmologie and Otology, iii, 1, 63. Two new cases.

1853. Haynes Walton. Med. Times and Gazette, 1853, ii, 469.

1855. Haynes Walton. Ibid, 1855, ii, 163. Two cases of somewhat different nature treated by scraping off the opacity.

Cases of transverse corneal opacity forming in eyes already blind have been published by Spencer Watson, (Trans. of Path. Soc., xxii, 255, for 1871); Nettleship, (Ophth. Hosp. Reports, vii, 550 and 558); Brailey, Ibid, viii, 295, ix, 80; and by others.

ABSTRACTS OF RECORDED CASES,

IN THE ORDER OF THEIR PUBLICATION.

The numbering is continued from Case 5 already given in the paper.

By the kindness of MR. FAIRLIE CLARKE I have been able to follow up the three cases published by him in 1870, and to add some new matter to them (Cases 12, 13, 14).

CASE 6.—John Trevelyan, cabinet-maker. Disease appears to have come on with unusual speed, and the opacities to have become fully formed in less than a year.

Admitted. Æt. 58. Transverse stripe of brownish very super-

ficial opacity across cornea entirely hiding pupil and middle third of iris; traversed by a few delicate cracks; widest at middle and tapering towards inner and outer margins; covered by healthy epithelium. Symmetrical.

No complications. Pupils small, but iris quite healthy. No inflammatory symptoms at any time. V. good when objects are held above or below, but he is nearly blind for objects placed opposite the opacity.

Treatment.—Epithelium and sub-epithelial film scraped off. The film chipped off in small flakes which Mr. Taylor found composed of phosphate and carbonate of lime. Corneal tissue beneath film quite clear. V. so much improved that he could see to do his work after operation as well as ever.

A year after operation no trace of fresh deposit on the cleared space.

(Dixon, "Diseases of Eye," 3d edition, p. 114. Oct. 16, 1848. Case completed, *Brit. Med. Jour.*, 1871, i. 443.)

Case 7.—John Kemp, house-painter, healthy constitution. Æt. 45. A slight ophthalmia leaving no trace.

Æt. 48. Wife noticed a speck on each eye, but it did not interfere with sight.

Æt. 51. Opacities had increased and now interfered with central V. in strong light.

Æt. 55, (Jan., 1849). Stripe of brownish opacity across cornea, quite hiding pupil and part of iris; finely mottled with dark dots; surface of cornea bright and smooth and epithelium healthy; stripe widest at centre, tapering towards ends, its margins rather abrupt, coming nearer to inner than outer edge of cornea but not reaching either; direction nearly transverse but sloping a little downwards as well as outwards, and its lower border corresponding exactly with border of lower lid when eyes adjusted for near objects. Symmetrical. On one eye it showed a crack at inner end. V. only large objects.

No complications. Iris and pupil perfectly healthy.

Treatment.—Epithelium and film scraped off. Film came off in little chips which whitened when dry, and consisted of highly refracting rounded grains arranged in a close network beneath epithelium. Professor Miller found the chips to consist chiefly of carbonate of lime with some phosphate of lime and phosphate of magnesia. V. after operation improved to 4 or 6 J.

Three years and a half later (Sept., 1852), æt. 58 or 59. "The cleared part in front of the pupil in each eye remains perfectly clear, and the opacity terminates by the sharp edge left by the removal of the central portion of the flaky deposit. He sees to read the smallest type."

(Bowman, "Lectures on Parts concerned in Operations on the Eye," p. 117, with wood-cut of cornea and of microscopical structure of the deposit. Jan., 1849. Case completed, *Med. Times and Gaz.*, 1852, ii, p. 264.)

Case 8.—John I. Lee, formerly a glass-engraver, a hale old man.

Æt 73. Sight began to get cloudy; after a time became unable to see things straight before him but could see upwards and downwards.

Æt. 78, (1852). Elliptical band of light brownish opacity horizontally across cornea; broadest at centre and quite hiding the pupil; appears granular. V. only shadows. Symmetrical.

No complications; iris and pupil quite healthy.

Treatment—Epithelium and film scraped off; film came away in little scales; subjacent cornea perfectly clear. A few days later could see small objects such as pins quite well.

(Bowman, *Med. Times & Gazette*, 1852, ii, p. 264. Reported by Hutchinson.)

Case 9.—v. Graefe's paper, (Fig. 1). Representation of *L.* eye. Two semi-opaque brownish yellow patches at inner and outer part of cornea rather below horizontal diameter; upper border straight; lower, curved downwards corresponding to border of lower lid; central part of cornea unaffected. The patches begin just within the border of the cornea and are most dense there.

Treatment.—Iridectomy downwards: eight days after it V.=¾; no note of previous V.

(v. Graefe, *Archiv. f. Ophth.*, xv, iii, p. 145 and Plate 1, 1869.)

Case 10, (Ibid., Fig. 2). Representation of *R.* eye. Two patches passing from inner and outer part of cornea towards middle but not quite meeting; centre clear; the opacities as a whole nearly transverse, abruptly margined, upper border nearly straight, lower rather curved downwards; most dense near edge of cornea; a narrow rim of clear cornea separates the outer border of the opacities from the boundary of the sclerotic.

Pupil round and iris clear. Tension not noted. Disease in an early stage.

Case 11.—(Ibid. Figs. 3 and 4), *R.* and *L.* eyes of the same patient.

Fig. 3. *R. eye:* Complete transverse band of opacity rather below horizontal diameter; upper border nearly straight, lower slightly curved downwards; nearly of equal width at all parts; margins everywhere abrupt; narrow rim of clear cornea between the ends of the opacity and the border of the sclerotic; a small part of the undilated pupil remains uncovered; the band appears formed by coalescence of two separate ones such as shown in Figs. 1 and 2. Duration 8 years.

Complications: Extensive iritic adhesions and muddy iris. T. increased.

Treatment.—Iridectomy has been done upwards.

Fig. 4. *L. eye;* patch of opacity extending from near outer margin to centre, but none on inner part; less uniform than in most cases and shows numerous calcareous spots (some were examined). Duration, 12 years.

Complications: Total posterior synechia; iris degenerated; T. much increased; no perception of light.

Case 12.—John Woodfield, traveller; hale, ruddy, healthy looking, but latterly nervous and liable to giddiness. Perhaps had syphilis about æt. 25. No examination. Father was "a martyr to gout," but patient had not had it.

Æt. 53, dimness of sight first noticed; gradually increased.

Æt. 55 (1877). Stripe of rusty brown opacity across cornea nearly horizontal but sloping a little downwards as well as a little outwards; edges slightly shaded off; overlying epithelium smooth and not raised. Symmetrical but larger in *L.*

No complications; pupils dilated well to atropine; ophthalmoscopic appearances healthy. Neither pain nor inflammatory symptoms at any time. No operative treatment.

Patient died about three years later; no details obtained (note from wife, Nov. 1877, E.N.)

(Fairlie Clarke, *Brit. Med. Jour.*, 1870, ii, 380, Case 1.)

Case 13.—George Hill, water-gilder; pale, thin, delicate looking, light hair, gray irides; no history of gout, rheumatism or syphilis in patient; but his father (also water-gilder) suffered

much from gout in feet, hands and knees. Patient is fifth in family of thirteen, of whom nine died in early life.

Æt. 25. "A cloud began to come before his sight."

Æt. 35. So bad that he could no longer see to work.

Æt. 40 (1870). Admitted. Oval patch 4 inches by 2 of rusty brown opacity horizontally across cornea corresponding to palpebral tissue, widest at middle, tapering to each end but more so inwards than outwards; inner end reaches nearer than outer end to border of cornea; outer end bifurcated or notched in *L.*, not so in *R.*; uniformly dense throughout, edges slightly softened, epithelium smooth and healthy. Symmetrical. V. 10 J. with each eye at 6″.

No complications; pupils dilated well to atropine; ophthalmoscopic appearances healthy. No pain or inflammatory symptoms of any kind throughout.

No operative treatment.

Æt. 48 (Nov. 1877). (Seen again and family history completed as above E. N.) V. somewhat worse; now just sees 12 J. when he has his back to the window and looks between his fingers; cannot see to do his work. Upper and lower part of each cornea quite clear. Pupils very active. Tension N. Of late the eyes have occasionally been irritable. Operation (scraping) advised but declined. (Fairlie Clarke, *Brit. Med. Jour.*, 1870, ii, p. 380, Case 2; also *Trans. of Path. Soc.*, of London for 1870, p. 331, Case 2, with wood cut.)

Case 14.—Thomas Pritchard, barometer-maker, but having very little to do with mercury; no history of gout, rheumatism or syphilis; no gout known in the family, two brothers of patient died of "consumption."

Æt. 34 or 35 The opacity began on *L.* eye.

Æt 38 (1855, came under care of Mr. Haynes Walton). Both eyes affected but *L.* the worse. Atropine by dilating pupils gave tolerable vision.

Attempt made to scrape off a part of opacity on *one* eye *(sic)*, but was ineffectual. The scraping consisted of epithelium with some pigment.

Æt. 50 (1870). Came under care of Mr. Fairlie Clarke. V. considered to have been improving somewhat for last few years. Symmetrical, but disease rather worse in *L.*

Oval gray-brown patch of opacity, horizontal and correspond-

ing to palpebral fissure, widest at centre and tapering to each end, not reaching border of cornea at either end, size, 5 lines by 3; margins sharply defined. In each the opacity is incomplete at centre where a patch of cornea over centre of pupil remains clear; this space is largest in *R.* where it communicates through an opening in the upper part of the opacity with the clear cornea beyond. Surface smooth and epithelium healthy. V. of *R.* 4 J. at 6″, of *L.* 10 J. at 6″.

Æt. 52. Had an attack of erysipelas of face.

Æt. 53. (May, 1872). Went to St. Thomas Hospital with albuminuria. Died suddenly a few days after admission. *P. M.* Pulmonary apoplexy. "Arterial branches through the whole of both lungs were atheromatous, *i. e.* opaque yellow and thickened." Considerable amount of fluid in both pleuræ but no notable adhesions. A small old calcareous nodule in apex of *L.* lung. Great enlargement and hypertrophy of all the walls of the heart (20½ oz.); endocardium thick, white and opaque. Valves competent. Moderate atheroma of aorta but no calcareous plates. Liver hard, somewhat nodulated, weight slightly diminished. Spleen small and hard. Kidneys small, hard, granular surface, very tough, cortex wasted, arteries rigid, with intense venous congestion. "No blue line on the gums; no sign of gout." Double hydrocele. (From record of post-mortem made by Dr. Payne.) (Haynes Walton, *Med. Times and Gazette*, 1855, ii, p. 163. Fairlie Clarke *Brit. Med. Jour.*, 1870, ii, p. 380, Case 3; and *Trans. Path. Soc.* of London for 1870, p. 331, Case 1, with wood engraving. Family history completed from son's account 1877; I have also to thank Dr. Greenfield for allowing me to examine and use the post-mortem record, E. N.)

In this case Mr. Fairlie Clarke thought the central clear space in each eye due to spontaneous chipping away of the film. This is the only case in which such a process has been suggested by the existence of a clear but irregular and abrupt space, such as is figured by Mr. Clarke. The appearances are just like the result of a successful scraping operation. Although Mr. Haynes Walton is stated to have operated unsuccessfully and on only one eye, it is possible that some error may have crept into his account of the case, or that the film was loosened and afterwards came away.

Case 15.—A man, æt. 58. Symptoms began in *R.* In about eighteen months opacity had covered transverse part of cornea;

not stated whether it began at centre or at sides. Came under care æt. 60 (November, 1868), with transverse opacity, reddish brown at sides, whitish at middle; eye irritable and dazzled. Three months later, glaucoma. Iridectomy followed by improvement of sight. Three years later (at 63), no glaucomatous symptoms, but stripe of opacity considerably wider.

L. eye began to suffer a year or more after *R.*; began as two lateral patches, and progressed slower than *R.* When first seen at 60 (November, 1868), patch of opacity on each side opposite palpebral fissure. Three years later, patches somewhat larger, but not yet met at centre; no irritation at anytime; no glaucomatous symptoms; fundus healthy; refraction hypermetropic $\frac{1}{24}$; sight normal.—(Landesberg, ARCHIVES OF OPHTHALMOLOGY AND OTOLOGY, iii, 1, p. 63, 18).

CASE 16.—A man, strongly built and healthy-looking. No note as to gout, but note the presence of *numerous peripheral* retinal hemorrhages, such as are often associated with gout (Hutchinson).

Æt. 53. *R.* eye began to tire more easily than *L.*; then V. began to fail, and eye became subject to "dazzling." Four months before admission pain and symptoms of glaucoma.

Æt. 55. Admitted. Only *R.* affected. Incomplete stripe of brownish opacity across horizontal diameter of cornea, centre remaining clear; surface smooth. Subacute glaucoma, with numerous retinal hemorrhages at lower part of periphery, and some at inner part nearer disk; myopia $\frac{1}{6}$.

Treatment.—Iridectomy. Sixteen months later good result, with no relapse of glaucoma, and no increase of opacity; retinal hemorrhages absorbed.

L. eye, myopia $\frac{1}{8}$, and no trace of disease at date of last note. —(Landesberg, Ibid., Case 2.)

CASE 17.—G. S., a man. Æt. about 44, dimness of sight began; does not know whether one eye preceded other.

Æt. 54. Opacity of central part of cornea, densest at middle, and sends out less dense streaks, especially towards lower-inner part; numerous very fine dots visible by focal light. Symmetrical, but denser in *R.*, where it is brownish yellow; in *L.* it is of dull-gray color. Can still see tolerably well. He has been under the notice of Dr. Saemisch at intervals for nearly ten years, and the opacity has in that time increased both in size and density.

No complications; visual field good. Tension normal. Myopia ⅓ in *R.*, V.=8 J.; myopia ½ in *L.*, V.=1 J., but not easily. Large posterior staphyloma in each.—(Obertüschen *Inaugural Dissertation:* Ueber Band-Keratitis, Bonn, July 23, 1872.)

Case 18.—I. D., a man. Æt. about 45 the disease began.

Æt. 71 fully developed band of opacity on cornea, nearly horizontal but sloping outwards and rather downwards, and corresponding exactly with the half-opened palpebral fissure, equally dense all over. Remainder of cornea clear excepting *arcus senilis.* Symmetrical. V. only shadows.

Complications: Lens calcified and iris muddy; iridectomy upwards has been done in both eyes. Visual field and tension normal.—(Ibid., Case 2.)

Case 19.—A patient with well-defined band-shaped opacity corresponding to the half-opened palpebral fissure. Myopia ⅙, and sharply defined posterior staphyloma. Tension normal. Not stated whether one or both eyes affected.—(Ibid., Case 3.)

Case 20.—A patient with central opacity as yet but slightly developed, but "showing a tendency to progress towards the edge." Not stated whether one or both eyes affected; but both have been glaucomatous for a long time.—(Ibid., Case 4.)

The two following cases are probably of a different nature, but they illustrate the successful result of mechanical removal of the opacity:

Case 21.—A man; had some lime thrown into one eye. Was treated promptly, but dense opacity remained.

Four years later (æt. about 50), dense white opacity covering nearly two-thirds of cornea, and quite concealing the ordinary pupil; smooth and uniformly covered by epithelium; surface "appeared" slightly elevated.

Treatment.—Opacity removed with a small iris-knife; after removal of epithelium the opacity "chipped off in small flakes," which, chemically tested, were found to consist of carbonate of lime,

V. restored almost perfectly.—(Haynes Walton, *Medical Times and Gazette*, 1855, ii, p. 163.)

Case 22.—Elizabeth Wheeler; no facts of general interest to be gained from the history.

Subject to inflammation of eyes from childhood, and V. as bad as on admission for about ten years.

Æt. 29 admitted. Conditions symmetrical, but worse in *L.* Central, large, densely opaque, sharply-defined patch of French-white color on cornea; "slightly raised;" irregularly circular. There were dots or mottlings on the patch. The pupil quite concealed. Rest of cornea transparent.

Eyes seemed otherwise healthy; pupils dilated.

Treatment.—Repeated scrapings with minute gouge restored V. of both eyes to such a degree that she could thread a common sewing needle. Treatment extended over more than a year. She is stated to have been practically blind for the previous ten years.

Opacity did not feel gritty; no note of chemical or microscopical examination.—(Haynes Walton, *Med. Times and Gazette*, 1853, ii, 469.)

EXTIRPATION OF AN OSTEOMA FROM THE ORBIT.

By Prof. W. MANZ, of Freiburg, I. B.

(*With Table V., Fig.* 1.)

Translated by Thos. R. Pooley, of New York.

ALTHOUGH the frontal sinus not infrequently appears to be the point of origin of bony tumors, which afterward penetrate into the orbit, literature contains few examples in which their origin has been in the maxillary sinus. Nevertheless, at least in an anatomical sense, the conditions which favor their growth, of which up to the present time we possess no exact knowledge, are here just as favorable as there; and from this situation the neoplasm afterwards penetrates through the lower and inner wall of the orbit. Its appearance in the neighborhood of the eyeball, and the displacement of the eyeball produced by its increase, point to the development of a tumor in the orbit. As soon as, from the unusual hardness, the bony nature of the tumor has been recognized, we may be certain, more than in any other kind of growth, to find on extirpation a considerably larger tumor than the strabismus and palpation would have led us to imagine. Exostosis of the inner surface of the orbital wall being both simpler and more frequent it will not always, even with the assistance of the anamnesis, be possible to make a certain diagnosis of a tumor of extra-orbital development, and yet it would be of much advantage to know beforehand, as nearly as possible, its seat, *i. e.*, its origin and the direction of its growth. The mode of attacking the tumor would be more rational, the execution of the operation more rapid and certain, than if

the origin and size were disclosed only during the operation. Many such operations on account of the benign character of the growths and the great danger attending their removal, could with advantage to the health of the patient be abandoned.

The danger is naturally greater in such osteomata as proceed from the frontal sinus and cranial cavity, while it is much less in those which grow upward from the upper jaw, even though they be of considerable size. But that in the latter the operation may present unforseen difficulties from underrating the size of the tumor, is illustrated by the following case which occurred in my clinic several years ago:

Frederica Kaiser, 20 years of age, a very robust peasant girl from the Black Forest, presented herself for admission June 11, 1873, on account of a tumor in the vicinity of the left eye. She was less inconvenienced by its presence than by the continuous lachrymation, which, after suffering for two years, caused her at last to seek medical aid. She could give little information about the development of the tumor, but looked upon it more as a remnant of an inflammatory swelling in the neighborhood of the lachrymal sac, which made its appearance about two years since, but had not recurred. She did not complain of pain and only desired to be freed from the continuous lachrymation. In other respects her health was all that could be desired, and she had no recollection of any injury. Upon examination, a tumor was found in the inner angle of the left eye, which was covered by a somewhat reddish but otherwise healthy skin, and had a bony-hard feel. It was situated in the region of the lachrymal sac, and seemed to be about the size of a hazel-nut; it rose somewhat above the lower rim of the orbit, which, moreover, could be distinctly felt throughout its entire extent. The inner palpebral ligament behind which the principal mass of the tumor lay, was nearly three times as long as that of the right eye.

The globe was nowhere in direct contact with the tumor, from which it may be inferred that it was not noticeably pushed to one side nor hindered in its movements; only in looking strongly inwards the lower part was pushed behind the prominence made by the margin of the lid. The acuteness of sight was normal in both eyes, diplopia was not present, and only the intense lachrymation obstructed the vision. The cheek in the neighborhood of

the eye was somewhat swollen, but the swelling seemed to be limited to the soft-parts and especially the skin ; no extension to the bone could be felt in any part, the teeth and gums were unaffected, and no obstruction of the nose was complained of. The tumor, even upon considerable pressure was not painful, neither was there spontaneous pain in or around it, mobility of the growth could not be demonstrated.

The diagnosis of the character of the growth was made from its extreme hardness. Its situation and origin appeared to be in the region of the lachrymal bone, or somewhat more outward in the neighborhood of the anterior part of the inferior wall of the orbit. I expected to find a flat projecting exostosis, about the size of a hazel-nut and was prepared to pry it from the bone.

The operation was performed on June 11th, at 9 A.M., after the patient was fully under the influence of chloroform. I made a curved incision through the skin, beginning at the insertion of the ligamentum canthi interni, below the prominence formed by the tumor, and extending to the middle of the margin of the lower lid. After reflecting the soft-parts, the anterior face of the tumor came freely into view, and I now began with chisel and mallet to separate it from its bony surroundings. In so doing, I found that it extended further backward between the inner and lower walls of the orbit, than could have been felt before the operation was begun. The farther inward the chisel penetrated the more apparent it became, that the part of the tumor which laid under the skin, was only a projection attached to a broader base but which was movable with it, and that an instrument drilled into its side encountered quite another obstacle than could be offered by the floor of the orbit.

This furrow, which is distinctly visible in the illustration, had to be left, in order to attack the farther surroundings, while the eyeball was drawn outwards. After the tumor had become movable the greatest difficulty seemed to have been overcome, but this was not so. Although the mobility gradually increased, I could not for a long time succeed in drawing it out. Nearly all my instruments bent or broke, and even some stronger ones, which my colleague, Prof. Czerny, had brought from the collection of the surgical clinic, proved too weak to overcome the obstacle. The tumor, whose considerable size, although we could not see its under surface, had now shown itself ; had become so movable that it could almost be turned around.

In making one such trial, in which the eyeball was strongly protruded, the pupil suddenly dilated, and contracted again only after the operation, but has remained somewhat more dilated than the other ever since. At last it was clear that the lower margin of the orbit, on which the tumor always caught, no matter which way it was turned, presented the only obstacle to its removal. It was decided, therefore, to remove it, and when this was done it could be taken out. Behind it lay the points of a pair of strong scissors which had been used as a lever.

It was a long and tedious operation, in which my friend Czerny assisted me by both advice and deed. We had worked for nearly two hours, and would have arrived sooner at a conclusion had we better understood from the outset the form and origin of the tumor. The antrum maxillare was now fully exposed, and a large portion of the floor of the orbit had been removed, the hemorrhage, which throughout the operation had been unimportant, soon ceased of itself.

In the meantime the patient had recovered consciousness, and responded to my question, "If she could see out of the eye?" to my great satisfaction, "Yes." The acuteness of sight under such circumstances could not be determined. The wound, which during the operation had been enlarged according to necessity, was partially closed by sutures, the middle part being left open.

Soon after the patient was put to bed, repeated attacks of hæmatemesis took place, which ceased for a time after a dose of morphine, but recurred again after midnight. The patient complained of a violent headache, which on the following day abated. At the same time the temperature rose to 38.6° C., and erysipelas began in the neighborhood, in which the eye also participated, and a pale œdema was now developed. The redness and swelling extended down to the cheek, and across the nose to the other side. After the removal of the sutures the wound showed no signs of union, yet its edges were closely applied to each other. Secretion appeared only after several days. A thin greenish offensive discharge ran from the middle part of the wound, which had been left open. The general health, however, was tolerably good. On two days only the temperature reached 40°.

A similar secretion soon issued from the left nostril. From the eighth day the patient improved; the fever rapidly abated; the headache diminished; the swelling disappeared, and soon the secretion assumed better character, and lost its odor. A cursory

examination of the acuteness of vision of the left eye showed that fingers could be counted at a distance of several feet. Up to this time ophthalmoscopic examination had not been possible.

On the tenth day the improvement, from some unknown cause, was temporarily interrupted by a sudden rise of temperature, and the erysipelas somewhat extended. The following day both again subsided, as well as a slight difficulty in swallowing, which had made its appearance at the same time. There existed for a long time, between the left nostril and the wound of the skin, a very slight communication, through which the cavity of the wound was cleansed. The healing of the wound, however, made such rapid progress that on June 26th, the day on which she was discharged, only a small quantity of the fluid injected into the nostril escaped through the opening in the skin. According to an account, which I received soon after the patient went home, the wound was entirely healed.

Examination of the eye at the time of her discharge gave a considerable improvement of vision, $\frac{6}{200}$, the pupil was still wider than the right; in the fundus the retinal veins, especially the lower branches, were somewhat dilated and tortuous; the papilla, however, was normal. The globe seemed to lie rather deep in the orbit, no doubt owing to its still somewhat swollen surroundings. The healing, as I occasionally heard, was permanent. The lachrymation gradually grew less, as is usual after destruction of the lachrymal sac. I do not know whether it entirely ceased, since I have not heard from the patient for some time.

The upper surface of the tumor, of which Fig. 1 is an illustration in natural size, weighed in a fresh condition 26.1 gm.

Its under surface is very much more irregular than the upper, which, in spite of its numerous small depressions and several truncated prominences, shows a certain smoothness, while the other is rough throughout, covered with low sharp-edged elevations, and also with irregular furrows.

So long as the tumor was still in its original situation but a small portion of it could be seen or felt. Before its removal it had been turned round several times. I am therefore unable to give precisely its position in relation to the orbit.

But from the irregularity of the surface, it seems to be clear beyond doubt that the side above depicted and described as the upper one was indeed the free surface, *i. e.*, that which projected into the maxillary antrum, a portion of which had then perforated the floor of the orbit and grown upward behind the lower orbital margin in the shape of a cone. That this projection had here reached the upper surface, the examination before the operation showed, and the furrow which the chisel had grazed on its margin for the purpose of its removal, also indicated.

On the other hand, the furrows and rough projections of the opposite surface pointed to connection with neighboring bone, which had either loosened itself during the latter stage of the development of the tumor or else had been split off during the operation.

The first appears to me the more likely, for I found immediately after the operation the whole cavity of the wound lined with a soft, red, easily-bleeding tissue, whereas rough bone could be felt only on the floor of the orbit and its lower border.

The surfaces made by the sawing of the tumor were shining white and homogeneous throughout; the microscopic examination revealed the so-called ivory structure, but whether throughout the whole specimen or only in part remains uncertain, as not all of it was examined.

While the character of the neoplasm is undoubtedly that of a so-called ivory exostosis, it is not possible to give a definite opinion as to its origin, for it cannot even be positively demonstrated in which of the bony cavities the tumor took root. As the tumor evidently penetrated into the orbit from below, its original seat could only have been in the antrum of Highmore or the nostril, of which the first is the more plausible, for if it had been developed in the latter it would have led to other difficulties and malformation of the nose. Nevertheless it might have happened that early in its development the tumor found its way from this situation into the maxillary antrum, so as to leave the external form of the nose unchanged. The disturbance of the conduction of the tears, the symptom first noticed by

the patient, must in this way have been produced very early by stoppage of the nasal duct.

As, however, such neoplasms grow very slowly, it might be that by its pressing against the lachrymal bone the sac was compressed, thus causing the epiphora. At all events, an abnormal communication was established between the neighboring bony cavities, as was demonstrated by the prompt escape of fluids through the wound when injected into the nose, and *vice versa.*

That the condition was not afterwards present, or only noticed in forcible syringing, is not necessarily to be explained by a bony closure of the communication, as the filling up of the cavity of the wound by granulation could have prevented the water from escaping through the outer wound. As the tumor finally presented itself in the orbit, the possibility of its origin from the ethmoid bone, which seems to be the most frequent starting point of osteomata of the frontal sinus and nostrils, suggests itself. In this case, however, the inner wall of the orbit would more likely have been the first penetrated than the lower.

Then also remains, as the greatest possibility, that the tumor developed in the antrum Highmorii perhaps from its middle wall. If against this origin, a priori, nothing can be advanced, as the anatomical relations here are very similar to those of the frontal sinus, we here also meet with the same difficulty to determine in which of the tissues in that place was the matrix proper of the tumor.

It is known that different opinions are entertained by pathologists in regard to it, and the possibility cannot be rejected that the origin of the growth may differ in different cases.

Since, as we have said, the anatomical, respectively histological relations in the maxillary cavity are analogous to those in the frontal sinuses, all the hypotheses relating to the development of those tumors can be applied to our case; Arnold's embryological investigations might here likewise come into consideration since also in this locality preformed cartilaginous parts of the primordial

skeleton are found,* at least in its immediate vicinity.

The abnormal healing may have been the consequence of the course of the operation, but it is more probable that the erysipelas was due to the unfavorable hygienic conditions of the hospital, the ophthalmic wards being at that time in the immediate neighborhood of the surgical department.

* J. Arnold, Two Osteomata of the Frontal Sinuses. *Virchow's Archiv. Bd.* l vii.

THREE CASES OF RETROBULBAR, PULSATING, VASCULAR TUMOR—LIGATURE OF THE CAROTID—RECOVERY.

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Translated by Dr. É. S. Peck, of New York.

BY chance there fell to me three cases of this relatively rare form of retrobulbar tumor. Eighty-five cases have to my knowledge been communicated to the literature, exclusive of my observations, so that the number of all the cases has now increased to eighty-eight.

I published the first case, in connection with the therapeutical attempt, made shortly before, in Zehender's *Klinische Monatsblätter f. Augeuheilkde.*, January, 1875, p. 38 ff., without being in position to give accurate information at that time in regard to the final result of the treatment. I can now do this, and at the end of this paper will subjoin the result, with a brief recapitulation of the history of the disease. But first I take the liberty to communicate the two other cases.

The patients were again miners, one of whom, H. Agot, 16 years of age, drove horses in the mines. On the 6th of April last he had the misfortune, while detaching coal-wagons, which were coupled together, to engage his head between the buffers of two adjacent wagons, so that for several seconds his head was severely pressed from side to side. He immediately became unconscious; blood streamed out of the nose, mouth and ears; he could no longer stand up, and was immediately carried into daylight. His consciousness did not return at once, a condition of

stupor and somnolence remaining for several hours. No symptoms of any injury, except cerebral irritation, being present. The physician employed a strict antiplogistic treatment by means of ice-bladders to the head, local blood-letting and the administration of laxatives. Consciousness returned after a few days, yet the patient was unable to recall the events on the day of the accident. He complained only of severe headache, a peculiar noise in the head and occasional nausea.

No symptoms of paralysis could be observed except paralysis of the external rectus of the left eye. Convalescence advanced with comparative rapidity, so that he was able to present himself to me personally May 24th.

He was of a weak, delicate constitution, of a pale, anæmic color, and complained of double vision, caused by strabismus convergens paralyticus oc. sin. The eye could not be turned outwards beyond the middle line, but it yielded to passive movements. No other appearances of paralysis were present, either in the eye or elsewhere. The acuteness of vision was completely normal in both eyes, although the patient stated that he had suffered from occasional squint from his youth ; and although the mother maintained that her son when a little child, had been paralysed in the left eye for some months. I still supposed from the description and from the probability of the existence of a fracture at the base of the skull, as well as from the absolutely good perception of sight with this total paralysis, that the cause of the paralysis was to be laid at the door of the injury which had taken place. On this account I took the patient into the hospital, in order to place him under an electric course of treatment.

On the first day the account of the patient escaped me as regards the noise in the skull, which was observed immediately after the return of consciousness, my attention was then directed to the left eye. Both eyes protruded more than normal beyond the cavity of the orbit. On the following day the somewhat more marked prominence of the right eye first struck me, while at the same time every part of the organ was found absolutely normal.

An attempt to put the eye back was accomplished with a certain amount of pressure, my finger however, was lifted with a light rhythmical impulse. When I laid my ear over the eye, I heard a strong, systolic humming noise of a distinctly blowing character. Pressure on the right common corotid artery, produced a complete cessation of the noise at the moment of the compression ;

but at the same time the patient swooned. Awakened from the fit in a few minutes, he explained that everything became black before his eyes at the moment of cessation of the noise, and he was no longer able to stand. When this experiment was again repeated, it was immediately followed by the same result. Here, then, was a vascular tumor occupying the retrobulbar region, which stood in direct communication with the arterial system of blood-vessels, and produced the prominence of the right eyeball. By cutting off the blood-supply, the phenomena of pulsation in the tumor disappeared; while, in the meantime, an anæmia of the right half of the brain with loss of consciousness suddenly supervened. This phenomenon was clear to me from the account of the mother, who stated that when a boy, her son had suffered from paralysis of the left side for a long time. Evidently there was a general contraction of the vascular system of the right hemisphere of the brain.

In the meantime the prominence increased daily, the globe protruded farther from its cavity, the conjunctival veins became more intensely injected, and the pulsation was more clearly perceptible to the overlying hand, while the acuteness of vision remained the same. The paralysis of the left external rectus showed no improvement. It was impossible, from the symptoms already described, to have recourse to compression of the carotid, as the patient could not bear the pressure longer than a few seconds. The treatment was limited to the use of tonics and electricity. After an application of feeble pressure for six weeks, during which time all the symptoms which up to this time had become more marked, he was able for a few seconds to bear compression by which the pulsation, buzzing and prominence subsided for a moment. Gradually the paralysis of the externus began to diminish, the left eye could be moved farther outwards, and the distance between the double images grew less when the patient looked to the left.

In the meantime the right advanced from 4 to 5 *mm.* before the level of the left eye. Pressure from behind had been followed by a paresis of the levator palpebræ with ptosis, and the globe was dislocated downwards and inwards.

Ophthalmoscopic examination brought to light a marked venous engorgement of the retina and optic disk, but pulsation of the intra-ocular vessels could not be demonstrated.

Although the more urgent symptoms demanded energetic inter-

ference, the ligature of the carotid was the only safe remedy that could be adopted.

After eight weeks, during which the patient had accustomed himself to endure compression at gradually longer intervals of time, he was ready for the operation on July 22d. The operation was made under chloroform after Hunter's method, on a level with the superior border of the thyroid cartilage, and with a close observation of Lister's principles.

The artery, after the necessary separation of the superior laryngeal nerve, was laid bare, and ligatured with catgut, the ends were cut off in the wound, and the wound was united with the same material. Immediately after tying the knot, all the phenomena of the aneurism—pulsation, bruit, etc.—ceased; the eyeball was easily replaced, and, gradually with the letting-up of the pressure, slowly fell back into the position it had previously occupied.

On awaking, the patient complained of burning in the wound and pain in the throat, especially during deglutition. The temperature increased at evening nearly one-tenth of a degree (Celsius), the pulse to 100. The night's rest was disturbed by a feeling of pain in the neck.

The temperature on the next day, July 23d, rose to 38° *C.*, while the patient, otherwise very sensitive and irritable, complained of increased pain in the throat. The use of ice-pellets procured a certain amount of relief. The symptoms in the eye had already sensibly diminished. The injection of the conjunctival veins and the exophthalmus were less pronounced. The wound after twenty-four hours did not require a change of bandage, and secreted a serous fluid. The temperature did not rise beyond 38.3° nor the pulse beyond 120 per minute for the next three days. The difficulties in swallowing continued during this time. The wound was not closed by first intention, except in its middle portion, but secreted a slight quantity of good pus.

In three days all bad symptoms disappeared; the patient was able to abandon fluid nourishment, and to swallow harder morsels without a sensation of pain. The eye receded about 2½ *mm.* into the orbit; the upper lid could be moved more freely, and became more supple, while the down and inward displacement of the eye disappeared. The double images continued in the mean time, especially when the eye was directed to the right and upward. The patient asserted that he was still cognizant of the noise, al-

though the pulsation was never again perceptible to the touch, and only a very distant, tinkling sound could be heard with the stethoscope in the superciliary region of the os frontis. Seven days later, when the last suture had sloughed away, and there only remained a slight secretion from a depression in the middle of the wound of incision, the Lister bandage was removed, and the patient was able to leave his bed. An attempt was now made by exercising the right eye alone, to restore the function of the muscles of the eye, which had for a long time remained powerless, while the paresis of the rectus ext. of the left eye was entirely removed. The patient now felt better every day since his freedom from the distressing, whistling noise. The eyeball retreated gradually to its normal position; the double images, in unconcerned vision, were less apparent than formerly; the upper lid could be completely raised; and there only remained a slight degree of exophthalmus and strabismus convergens. The wound was closed, with the exception of a little opening, while the ligature of the carotid could no longer be perceived. The patient was discharged cured on August 12th, twenty days after the operation.

One month later I saw the patient again. There was still present a slight dilatation of the superficial veins of the ocular conjunctiva, which, from four to six in number, ran in a tortuous way over the superficies of the globe. The right eye still protruded about 1–1½ *mm.* before the left; but the ptosis, strabismus convergens and diplopia had entirely disappeared. The wound in the neck had smoothly healed, and an arterial pulse in the region supplied by the right carotid could no longer be detected. When the ear was applied to the left half of the skull, especially in the left temporal region, there could still be heard a distant tinkling, feeble-blowing noise. On the right side, at the point of the primary affection, the same bruit was very faintly heard, only by attentive listening. The patient felt so well and robust that he desired to resume his mining work, and I had no reason to detain him therefrom any longer.

Taking a brief critical retrospect of the history of this case, we notice with special interest the long interval of four weeks in which exophthalmus developed, although we must from the nature of the symptoms accept the fracture at the base of the brain as the etiological element. This fact can

find an explanation only in this: that at at the beginning of his illness the patient, having become weak through loss of blood, grew very anæmic, in consequence of which the circulation was less active. From the onset he kept very quiet and mostly in a recumbent position in bed. When he first abandoned this position, and undertook the little journey from his house to my residence, and afterwards to the clinic when he was more out of bed than in it, and in this way was more frequently engaged in different movements, for example, stooping, there occurred a congestion of blood in the venous system. At this juncture the impeded column of blood began to make pressure on the eyeball from behind, and to push it gradually forwards, while the subjective symptoms naturally remained the same. The eyeball itself, restricted only by the feeble opposition of the upper lid from further protrusion could easily overcome this resistance, and yielding to the stronger impulse of the blood, deviated inwards and downwards. The venous stasis, thereby more increased, was further demonstrated by the repletion of the anterior veins of the conjunctival tissue.

That the compression of the carotid in this case must more readily and safely lead to a complete cessation of all symptoms of a pulsating exophthalmus, is easier of explanation, than that by means of the same, an anæmia of the whole right half of the brain could be induced; such an anæmia would assert itself at first as a sudden attack of faintness, and lead to an incapacity of function of this part of the brain, which could only disappear upon the letting up of the compression, and the return of the circulation in the carotid region. Whether at the same time the statement of the mother can be cited for the explanation of this appearance, that the boy during the period of dentition suffered from paresis of the left extremities, and subsequently from an affection of the right side of the brain, and therefore, that a deficiency of nutritive supply for the organs of the right hemisphere remained, I leave as an open question. This statement appears to me on the whole plausible.

This circumstance offers at least a precise indication for

the practitioner, not to proceed too rashly with the radical cure, lest more unfavorable conditions than before be introduced. The formation of collateral circulation in this case was a necessary element to the success of the operation, and had to be established with especial caution, whereas its rapid development in other cases, as particularly disagreeable and likely to frustrate a good result, has to be avoided by an early ligation of the carotid. No good result could be promised from the operation, until compression of the carotid had been carried on for a long time without injury.

In the third case which came under my observation and treatment, the indications for operation appeared under other conditions and in another light.

The patient, H. Drewermann, a miner, 23 years of age, was wounded September 17, 1878, while engaged in his work, in such a way that a heavy piece of coal, called in miners' parlance a "coffin-lid" (Sargdeckel), detached itself from the roof of the cave, and struck him on the right side of the skull with such force that he fell senseless to the ground, violently hurting the left side of his head. He was immediately found by his comrades, who stated that the blood poured in a stream from his nose and ears. He was taken directly to a hospital, where he recovered consciousness in a few hours, and, in addition to violent cranial pains, experienced a loud humming noise, confined chiefly to the left half of the skull. In addition to this, he was no longer able to move the left half of the face; the mouth hung down obliquely to the left. The patient could not move the jaw as in chewing, since all the teeth of the lower row had been loosened. On medical examination it was found that the whole right half of the skull and face had suffered a remarkable compression, with detachment of the epidermis; there were at the same time a simple fracture of the jaw, and a loosening of all the molars and incisors in their sockets. On the left side there was found paralysis of the facial nerve, falling of the inferior lid as well as of the angle of the mouth, anæsthesia of the whole left half of the face, together with a high degree of deafness in the left ear. In addition, there was protrusion of the left eyeball. Further, a venous stasis existed in the superficial veins of the conjunctiva,

while the visual capacity remained normal. The diagnosis of fracture of the base of the cranium was made, for which antiphlogistic treatment was adopted.

The condition of the patient, who was otherwise very healthy and robust, improved so rapidly that one week later the contusion on the right side gave rise to an abscess, which was opened over the lower jaw, and the headache ceased. Meanwhile the tinnitus aurium, the protusion of the eyeball, and the facial paralysis remained the same.

About five weeks later the patient was discharged from the hospital, since recovery from the paralytic conditions appeared to demand still a very long time, and no further phenomena of irritation of the cerebrum had developed themselves. He remained at home only a short time, when suddenly, in the second night, the left globe protruded further from its cavity with increase of bruit, so that by the next morning the inferior conjunctival sac was pushed forward out of the palpebral slit like a thick puff. The cause of this sudden tumor was probably to be found in violent exertions on the marital bed, as the patient had been married only three months when the accident occurred.

The prominence and swelling were so marked the next morning that he immediately returned to the hospital. Thence he was referred to me on November 2, 1878.

He had become somewhat anæmic, and the whole left side of the face was greatly changed. The left eye protruded so much that the paralyzed upper lid was scarcely able to cover the globe, while the depressed under lid was covered by a thick puff of bluish-red, chemotic conjunctiva. When the upper lid was raised, the conjunctiva itself was seen to be swollen in its whole extent by a plexus of thick, dark and tortuous veins. The globe was hard, stiff, and moved only slightly to the right and left. The cornea was somewhat anæsthetic to the touch. It was clear, as were also the refractive media. Visual acuteness was one-half; with the ophthalmoscope there could only be seen a dilatation and congestion of the veins, corresponding to the enlargement of the external vessels; the papilla was of a deep-red color, while retinal exudations and pulsation of the retinal vessels could not be found.

As the cause of this marked exophthalmus, the attempt to push the eyes back into the socket demonstrated a firm mass, yielding only slightly to pressure, by which rhythmical movements synchro-

nous with the pulse were imparted to the head with the stethoscope. A corresponding loud buzzing and whirring noise was heard, which increased with the pulse-wave, and likewise disappeared with its cessation.

The diagnosis was made of a retro-bulbar, pulsating tumor, which, by the pressure exerted upon all the parts in the posterior portion of the orbit, in particular upon the veins, caused a high degree of engorgement and swelling in the conjunctival veins. By the strong pressure from behind, the globe was dislocated forwards in such a way that all the external muscles of the eye were rendered powerless.

The great protrusion of the eye was in part also due to the facial paralysis, the lower lid no longer being used as a means of support and counter-pressure. The marked bulging of the conjunctiva in the shape of a puff-ball was produced by the same cause. The murmur and buzzing was most easily heard upon the surface of the globe itself. At the same time it was perceptible to the ear over the whole anterior left half of the skull, especially in the temporal region. Pressure upon the left carotid overcame all these phenomena; the eye could be more easily replaced, but always protruded again on removal of pressure; the noise diminished to a very slight murmur, and the patient felt a marked alleviation from the compression, especially in the feeling of tension of the globe. For a long time, however, he could not bear the pressure. On the first day of the compression it seemed as if we would succeed with the treatment since after a compression of half an hour a remarkable remission of the subjective symptoms was observed for two hours. The hope was of short duration, for no such change manifested itself again later, even after long-continued compression of the carotid. Therefore I proposed, in order to abridge the process, the ligature of the left carotid. This was permitted, and was arranged for two days later. I was, however, obliged to resort to it in a few hours, because a sudden arterial hemorrhage occurred spontaneously from the tense and prominent intumescence of the inferior conjunctiva. This could not be checked by any compression, except that of the carotid, and could easily lead to a dangerous hemorrhage in the present anæmic condition of the patient. As delay begets danger, I proceeded immediately to the operation, which, precisely as with the other case, was made under Lister at the height of the superior border of the left thyroid cartilage. With the exception of the

difficulty of avoiding an unusually marked prominence of the jugular vein, every part of the operation, made under chloroform, went off smoothly and well. Immediately after tying the catgut ligature bleeding from the conjunctival wound ceased, the bruit diminished to a distant, hardly perceptible murmur, and there was no evidence of pulsation. The patient, upon awaking from the narcosis, was immediately conscious of this remarkable amelioration of his condition, and did not complain either of cerebral phenomena or of pain in the throat while trying to swallow. The eyeball, on the contrary, could be replaced only slightly, and for a short time. The temperature at evening stood at the normal level, nor during the whole process of repair of the wound in the neck, which occupied four days, could the slightest elevation be observed. The catgut sutures gradually disappeared, and the ligature did not again come to the surface. The third patient complained less of difficulty of swallowing than the two first. The noise in the head continued at the same minimal degree which it acquired immediately after the operation, but a slight change occurred in the prominence of the globe. The conjunctival swelling remained the same, since the lower lid, by reason of its paralysis, failed to cover it. The patient wore the pressure-bandage with discomfort, on account of the severe ciliary neuralgia which supervened, and it proved of little benefit. The conjunctival injection and the facial paralysis therefore remained the same. The eyeball turned more easily on its horizontal and vertical axes. Catoplasms were resorted to, and a light protective bandage was applied. The patient, feeling entirely well, left his bed in six days.

The circulation in the superficial branches of the carotid totally ceased ; the strength of the patient visibly increased daily, still the prominence of the globe remained ; the lower portion of the cornea was uncovered, and, in spite of a protective bandage and daily oft-repeated touchings of the uncovered portion of conjunctiva and cornea with a salve of vaseline, a marginal ulcer made its appearance on the inferior border of the cornea about fourteen days later. After the style of atrophic ulcers, or of such abscesses as follow the section of the trigeminus, this increased in circumference and depth with remarkable rapidity, was accompanied by most severe ciliary neuralgia, and quickly extended over half of the cornea. Every medical and operative resource failed to produce a check to its progress, perforation ensued,

with marked prolapse of iris, which resulted in a slowly progressive irido-choroiditis. At the end of four weeks phthisis bulbi was the result, while the stump, which now occupied a position completely extra-orbital, remained in firm fixation. Four weeks later, the globe began to retract towards its normal position. The conjunctival swelling was moderate, the lower conjunctival fold could be replaced, and for the first time the lids could be closed by the energetic use of topical agents and the pressure-bandage.

The stump again followed the normal directions of movement, the conjunctiva became paler, but the lower lid could only be raised by a bandage, and in this way could the palpebral fissure be closed, since the facial paralysis remained the same. About two months and a half after the operation, the patient was in condition to leave the clinic, relatively cured.

If we take a retrospect of this case, we must declare the operation as perfectly successful in its effect upon the most prominent symptoms of the pulsating exophthalmus and its threatening phenomena. The observations of all recorded cases attest that prominence of the eyeball is the last symptom to disappear, and very naturally, since the globe is pressed forward gradually and for a long time, producing in all the tissues a certain condition of relaxation. Restitution to the normal state can, therefore, occur only slowly, and in this case demanded an unusually long time, while the eyeball had lost the natural counterpressure from the supporting lids and their closure, on account of the facial paralysis.

From the remarkably long continuance in the same condition, the marked venous stasis and the thickening of the parts situated behind the globe, I am disposed to believe that we had before us a chronic inflammation of the orbital cellular tissue. This may have involved merely the venous sinuses within the skull, or the whole retro-tenonian cellular tissue. At all events a long time was necessary to a complete restoration, while a direct causal connection with the insidious irido-choroiditis could not be denied.

Accepting the fact of a tardy retrogression of the exophthalmus, I take the liberty to communicate the final result of the first case of retro-orbital pulsating tumor which

fell into my hands, since it was impossible for me to do so when I published it in 1875. I will recall in brief to those who have not read the case, its main points:

The patient was another miner, who was so buried in the mine with overhanging and loose masses of coal, that he was obliged to remain some time with his head wedged between coal and stone. In consequence he suffered a fracture of the base of the skull, momentary unconsciousness, and all the symptoms of inflammation of the meninges.

Twenty-four hours after the accident, he suddenly heard a loud, whistling noise in the left half of the head, and at the same time the eyeball began to protrude. The examination a few weeks later revealed every symptom of a left-sided retrobulbar, pulsating tumor, which I diagnosed as a diffuse aneurism, and treated for ten consecutive weeks by digital compression of the carotid. Only the ligature of the left carotid exerted a healing influence upon the symptoms of pulsation, exophthalmus and noises in the head. At the discharge of the patient from treatment, he stated that he heard the noise at about one-fifth of its former intensity, the pulsation had entirely disappeared, and the prominence of the eyeball was reduced about $3'''$; so the globe of this eye still projected from $1\frac{1}{2}'''$ to $2'''$ before that of its fellow. No circulation could be demonstrated in the branches of the left carotid.

The patient was allowed to return to his work in the mine, relatively cured.

My communication stopped at this point. I had to leave the question open, whether or not a gradual and complete disappearance of the still existing exophthalmus would result either from shrinkage of the aneurismal sac and coagulation of the blood by deficient circulation, or from obliteration of the ruptured end of the artery.

The patient resumed his work without being much annoyed from the double images caused by the prominence and lateral deviation of the left eye. The conjunctival injection was reduced to a few very tortuous venous trunks. The patient's condition was very good for about one year. He was able to lift heavy weights, unaffected by the muscular effort and the consecutive congestion. He

presented himself to me once a month. The prominence remained the same, and the tinnitus could be heard by careful listening. The bulb was easily replaced into its usual position, and no pulsation was perceptible. One arterial vessel, lying in the upper lid, and rising from the depth of the orbit, could still be felt by the fingers, and this was easily pressed back into the depth of the retro-orbital cellular tissue near the inner angle of the eye. One day the patient suddenly presented himself to me with the complaint that the tumor began to grow larger on the previous day, and pushed his eyeball strongly forward. He recalled to mind that on the day before he had overladen his stomach with a favorite dish, a thick mesh of peas, which was followed by violent vomiting. During the emesis he suddenly felt a cessation of the noise in the skull, and soon after a marked forward pressure of the eye. He was unable to move his eyeball as easily as before, and further observed more conspicuous double-seeing.

On pressure with the hand I found that the globe was again fixed—at least that it could no longer be replaced into the orbit; that all the movements were more or less interfered with, and that the prominence had increased from 1‴ to 1½‴. No intraocular change was demonstrated, and the S. was = 1. The tinnitus had completely disappeared, and not the slightest pulsation of the globe was perceptible. Absolute rest and poulticing were ordered. Headache was not present, and the exophthalmus began to diminish in a few days. The feeling of tension and pressure subsided, and the conjunctival injection became paler. For several weeks this condition of gradual improvement went on, until the patient could be dismissed about two months later, completely cured, the eyeball in normal position, without deviation to the right or left.

My presumption was thereby confirmed, viz., that perhaps a coagulation of blood had occurred in the aneurismal sac which had acted as a cause of its destruction. In all probability a stoppage of blood took place for a short time on account of the violent efforts in vomiting, the apparent channel was cut off by formation of a clot, a complete destruction of the sac ensued by gradual absorption of its contents, and the eyeball returned into its normal position.

Unfortunately, these three cases throw no clearer light

upon the still existing obscurity in the differential diagnosis of these pulsating, orbital or retro-orbital tumors.

We have to rely on the results of a few autopsies only, and these again, an account of the multiplicity of the published material, have contributed more to increase than to diminish the difficulties of diagnosing the kind of tumor from the symptoms. In not a single case was the old hypothesis introduced by Travers in 1869,* found correct, viz., that the affection was an aneurism by anastomosis in the orbit.† Twice only could a real aneurism of the ophthalmic artery in the cavity of the orbit be proved.

In one case of Busk,‡ in which ligature of the carotid had been successfully made on account of pulsating exophthalmus, the cause of the former trouble could be demonstrated several years later by the autopsy, as a rupture of the ophthalmic artery in the orbit. In all the other twelve cases recorded, the cause of the pulsating exophthalmus was found in degenerative processes in and upon the vessels of the tissues lying behind the orbit. In five§ of these autopsies, the venus plexuses of the orbital tissues and the neighboring cavernous, superior petrosal, and transverse sinuses showed inflammatory changes in their inner layers, varicose degeneration and thrombosis. In illustration, the remarkable case of Bowman‖ may be briefly alluded to. B. ligated the carotid of a woman, who presented herself for treatment with all the symptoms of a retro-orbital aneurism; whereas, at the autopsy no aneurism whatever, but a phlebitis of the cavernous sinus, could be demonstrated as the cause of the pulsations of the eyeball.

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* Travers, Med. Chirurg. Trans., vol. ii, 1813.

† Guthrie, Operative Surgery of the Eye, 2d ed., by Morton, orbital aneurismal disease. *Amer. Journal of Med. Sciences*, July, 1870. Wecker, Malad. des yeux, 1868, page 803. Observer, Passavant 1860.

‡ Busk, Med. Chirurg. Trans., vol. xxii, 1839, from Zehender's *Monatsbl. f. Augenheilkde*, 1868.

§ *a.* Gendrin, 1835, Leçons sur les maladies du cœur et de grosses artères. vol. i, page 240, 1841.
b. Bowman, *Lancet*, ii, August 11, 1860.
c. Hulke, Ophth. Hos. Reports, April, 1859.
d. Aubry. *Gazette des hôspitaux*, No. xliii, 1864.
e. Wecker, *Monatsbl. f. Augenhlkde*, vol. vi, page 406, 1868.

‖ loc. cit.

Nélaton* added to our knowledge of the pathogeny of these tumors a new and interesting observation. In a case of pulsating exophthalmus of the RIGHT eye, which was produced by a blow directed against the orbital border of the LEFT eye, he found the cause in a direct injury of the right internal carotid within the cavernous sinus. The injury was done by fragments of bone from the left orbit, which was driven into the right sinus, and had established a direct communication between the arterial and venous blood. The same observation of laceration of the arterial tube within the sinus was demonstrated† on the autopsy-table, in another case. Positive aneurismal dilatations of the internal carotid have twice‡ been found; and in two other cases§ the symptoms of pulsating exophthalmus were caused by a cancerous degeneration of the retro-orbital tissues, while one autopsy‖ demonstrated aneurism of the ophthalmic artery in the region of the sella turcica as the cause of disease.

If we attempt in brief to review the three cases observed by me under one head according to their symptomatology before and after the operation, I would adhere to my previous diagnosis in the case treated first, but described last; that is to say, it was a rupture of the ophthalmic artery, and at first a spurious aneurism, but soon after the blood, bursting the outer arterial coats, was freely poured into the retro-orbital cellular tissue, and communicated freely with the arterial current. After the lapse of one year and a half a cure was effected by the formation of a thrombus. This case was analagous to that communicated by Busk.

The second case, Agatz, from the character of its onset, the slow engorgment within six weeks, the slight degree of congestion of the anterior ciliary and conjunctival veins, and from its rapid disappearance after cutting of the blood-

* Demarquay, Traité des tumeurs de l'orbite, Paris, 1860.

† Hirschfeld, from Walter Rivington, Med. Chirurg. Trans., vol. lviii, page 184–298.

‡ a. Baron, 1535. Delens. Monograph from Rivington; b. Nunneley, 1858, Med. Chirurg. Trans., vol. xlii, 1859.

§ a. Nunneley, 1865, Med. Chirurg. Trans., vol. xlviii, p. 15; b. Lenoir, Bulletin de la Societé de Chirurgie, vol. ii, p. 141.

Nunneley, 1859, Med. Chirurg. Trans., vol. xlii.

supply off, belongs to the class of such diseases as result from an impediment in the return of blood, *i. e.*, upon inflammatory processes in the coats of the arteries and veins lying behind the orbit. This case may be classified with those, for which that of Bowman stands as an example.

Finally, the third case, by its sudden and severe onset, its excessive venous stasis in the anterior and posterior parts of the bulb, the remarkable protrusion, which increased with such rapidity on account of an active conjestion in the return current of the skull, and by its tardy involution after the application of the ligature, indicates an aneurismal dilatation of the internal carotid, or the rupture of the same artery in the cavernous sinus, with a direct communication between arterial and venous blood.

In consideration of the difficulty of the differential diagnosis, I make these assertions with the necessary caution, in the hope of their future confirmation by an autopsy, and believe that, in the main, it is more consistent with fact to drop the customary name used to denote this style of tumors, viz., "retro-orbital aneurism," and, for the sake of safety, to speak only of retro-bulbar pulsating tumors, or pulsating exophthalmus.

In my former communication I compiled 113 cases of ligature of the carotid, with regard to the per centage of cures. As these embraced not only cases of pulsating exophthalmus, for which this operation was used, but also cases from other causes, I confine myself at present more particularly to the statistics of the hitherto known 88 cases of pulsating retro-bulbar tumor.

Of these, 35 were on the left side, 30 on the right, while of the remaining 23 cases nothing definite was stated as to either side. In 47 cases an injury was the cause of the attack, and was found chiefly among men, while the larger number of idiopathic cases were reserved for women. As regards treatment, ligature of the carotid was made 50 times in 49 cases, 21 times of the right and 22 times of the left carotid, while in seven cases of ligature no mention is made as to which artery was tied; in one case both carotids were

ligated. The following table gives the success of ligature of the carotid in these 49 cases:

Good in . . .	33 cases,	or 67.4	per cent.
Partially good in .	6 "	12.2	"
No improvement in .	3 "	6.1	"
Death in . . .	7 "	14.3	"
Total . .	49 cases.		

It was found, that in 12 cases digital compression had been adopted, for a shorter or longer time, with more or less success. Complete cures resulted five times; but, from the character of the subsequent condition, considerable doubt may be expressed with regard to the correctness of these assertions in some of these cases. In nine cases, injection of medicinal agents, as ergotin, sesquichloride of iron, etc., was made into the tumor, that is, the retro-bulbar cellular tissue, and in several cases favorable results of this method of treatment have been reported. In three cases, spontaneous cure of the affection took place, without any therapeutical attempt; six cases were followed by death, and nine cases of the disease were observed in which no curative attempts were made.

SARCOMA OF THE CHOROID IN CHILDREN.

By M. LANDSBERG, of Görlitz.

(*Plate V, Figs.* 2, 3 *and* 4.)

Translated by Dr. C. Williams, of New York.

In the subject of choroidal sarcoma, which has received an unusual amount of attention, there are two points which need further light both in a clinical and anatomical sense. These are, first the occurrence of sarcoma of the choroid in children, and second, the relation of a former inflammation to the pathogeny of the affection. How far we are from agreement, from an ophthalmological side of the question, as to an inflammatory or non-inflammatory pathogenesis of choroidal sarcoma, may well appear from the views entertained by M. Knies upon the subject, which are opposed to those of Knapp,* and particularly to those of Virchow.† In his valuable contribution upon sarcoma of the choroid,‡ Virchow is not inclined to reckon among the sarcomata proper, those tumors originating in inflammatory processess. Assuredly the simple presence of elementary constituents in a growth of inflammatory origin are of themselves not sufficient to warrant us in classifying such growths as sarcomatous neoplasms, but only those should be denominated tumors κατ' ἐξοχήν the new-formed elements of which are stable and typically arranged, take the place of the mother tissue, act destructively and assemble in macroscopically appreciable number, (at-

* Knapp, Intraocular Tumors, p. 149, German edition; p. 203, Eng. edition.
† Virchow, Onkologie, Bd. ii, p. 249.
‡ These Archives, vol. vi, p. 376.

taining to the size of a hazel-nut, for example, as in my case cited in *Virchow's Archives*, 63, p. 267).

The appearance of tumors in childhood is of great importance as to the ætiology of tumors in general and of tumors of the eye in particular, since from that fact congenital predisposition to a tumor in many cases may be decided in the affirmative. According to the hypothesis of Cohnheim,* the predisposition to neoplasms forms a part of embyronal development; and according to Cohnheim an embryo may bring into the world with him a certain excess of cell-material, which under certain conditions of sufficient blood-supply, develops further, etc. From this standpoint it seems of particular importance to know that just that class of tumors whose prototype is found in the first stages of development of connective tissue organs, *i. e.*, the spindle and round-cell sarcoma, occasionally originates in the choroid of children and that the great resemblance of the elements of the tumor to certain forms of embryonic tissues as well as to some which are of inflammatory origin, is as little due to accident in the one case as the other.

The number of cases of choroidal sarcoma which have been observed in children is really very small, and except the four cases described in detail by Hirschberg, (*Zehender's Monatsbl.*, 1869, p. 83), Steudener (*Virchow's Archiv*, 59, p. 421), Nettleship (*Ophth. Hosp. Rep.*, viii, p. 264), whose patient was 12 years old, and Hirschberg (*Gräfe's Archiv*, 22, 1, p. 135), all of which had been repeatedly quoted in ophthalmological literature. I do not know of a single case of primary, infantile choroidal sarcoma, that was not the result of traumatism.

Considering further the value of the question as bearing upon the therapeusis of such cases, the report of the following new case appears justifiable.

Theodore Ludwig, 8 years old, a strong apparently healthy boy was brought to my notice by his mother, who was under treatment for a simple corneal infiltration, on August 21, 1877. His mother said that in the preceding June his right eye had been slightly red,

* Cohnheim, Lectures on Gen'l Pathology.

but the redness was not considerable, nor had there been much complaint of pain. There was no diminution of the vision of the left eye and the right eye had been able to read newspaper print up to within about four weeks previously, as the mother had frequently convinced herself by experiment. From that time there had been very rapid loss of sight, and now he is entirely blind in that eye.

The right eye is slightly injected, the tension is somewhat increased ; there are some old nubeculæ and fresh iritic exudations. The media are clear, with the exception of some few opaque striæ at the equator of the lens. Complete amaurosis. The retina is pushed forward and readily discernible to the unassisted eye. Its surface appears even and smooth without nodes. It does not move and shows no vessels upon its uniformly grayish-white surface. The mobility of the eye is not impaired.

On the next day the slight increase of tension which had been observed on the day before could no longer be demonstrated.

Glioma of the retina was diagnosticated and the eye at once removed. The cut-surface of the optic nerve and the orbit presented no appearance of disease. The wound healed kindly, though there was severe secondary hemorrhage brought on by vomiting. The boy up to the present time—1½ years after the operation—has remained in good health.

The eye was examined after remaining in Müller's fluid for several months. Length of axis 22 *mm.*, diameter 22.5 *mm.*, springing from the inner and the anterior half of the choroid a little below the horizontal meridian there was a small tumor (Figs. 2 and 3) beginning close to the posterior angle of the ciliary body. The posterior ciliary processes were still in contact with the prolongation of the neoplasm, which stretched out not only posteriorly and anteriorly but also transversely parallel to the posterior capsule of the lens, toward the opposite wall of the globe, being from 1.5 to 2 *mm.* in breadth and gradually shrinking, inserting itself into the ciliary processes of the outer half of the globe. The last mentioned outshoots of the tumor are nothing more than the thickened and degenerated retina, the anterior inner segment of which forms the inner surface of the neoplasm. The remaining retina, with the exception of the ciliary portion of the outer segment, is detached, folded and drawn forward. The entire space left for the vitreous measures 3.5 *mm.* in its greatest diameter.

The tumor itself is a *white spindle-celled sarcoma*, its cells having

a relatively large nucleus with a distinct nucleolus, while the basis-substance, at different places of the tumor, shows an extraordinary difference in form and quantity. From the point (Figs. 2 and 4) where it perforated the lamina elastica, the tumor crowds the pigment inwards. The posterior part of the tumor which is covered and slightly interspersed with pigment, contains small masses of round cells which are enclosed by spindle-cells, while the inner surface of the tumor consists of spindle-cells with firm fibres running parallel to the walls of the globe and posterior capsule of the lens. The forward extension of the tumor occurs in such a manner that the inner surface of the pigment layer, together with the cylindrical cells, and the most posterior ciliary processes are covered, and the edges of the zonula Zinnii are ensheathed without further implication of the corresponding portion of the choroid (Fig. 2) by the elements of the tumor which finally unite with the principal fibre-tract passing from the retina behind the posterior capsule of the lens. Thus a small anterior finger-shaped segment of the tumor (Figs. 2 and 3) is formed, distinguished by the palor of the cell membranes, the extremely white basis substance and the direction of its fibres which are perpendicular to those of the main tumor. Between the two portions of the tumor when examined microscopically, a narrow fissure is seen which, however, (Fig. 3) does not extend through its entire thickness. The retina at the parts above described is so blended with the tumor that no traces of its proper structure are visible. The retina is best preserved in the posterior segment, and its elements are most easily recognized in the inner and granular layers. Beyond the mem. limitans externa in the place of the layer of rods and cones there are great masses of round cells which are only distinguishable from the neigbboring granules by their length and their numerous nucleoli; between these masses is a fine network of connective tissue which becomes thicker and thicker right and left until it finally coalesces with the elements of the tumor which originate in the choroid.

The inner layers of the retina are however also invaded by the tumor elements, since the fibrous layer which is atrophic and intensely stained with carmine is destroyed and replaced by the fibres of the tumor.

Besides the main tumor, which is poor in blood-vessels, several microscopic collections of sarcoma cells are situated in the posterior parts of the choroid, which appears thickened. These

collections are enclosed on the inner side by the unbroken lam. elastica, which projects with a semicircular outline, and by the degenerated pigment layer; on the outer side by the internal layers of the choroid. The first appearance of the germs of the tumor could be demonstrated in the layer immediately adjacent to the outer surface of the choriocapillaris. The gradual transition of the posterior angle of the tumor into the more uniformly thickened choroid, by infiltration with sarcoma elements, is well represented by Fig. 4, with a low power.

Although the border of the tumor is rather abrupt, its elevation is nevertheless more gradual than is generally described.

The other changes in the uveal tract are briefly, hypertrophy of the lam. suprachor., dilatation of the choroidal vessels, and total posterior synechia. Only the inner lamellæ of the sclerotic, which were in contact with the older portions of the tumor, are infiltrated with round cells. The optic nerve is entirely free.

The principal interest which attaches to this case of sarcoma of the choroid in a child is concentrated in the opportunity of observing it in its early stage.

The anterior segment of the tumor evidently is the most recent portion of the neoplasm, and one can scarcely err in assuming that the elder portion of the tumor before its connection with the retina from which it received its firm fibrous basis-substance, had the same soft matrix and embryonic elements which still are present in the younger part of the tumor. We may reasonably suppose that the tumor, originating in the inner layers of the choroid, a long time before its perforation, had the type and form of embryonic tissue. In favor of the supposition of a long period of latentcy, it may be remarked that the destruction of tissue, associated with neoplasms in general, is often very slow. This was preëminently the case here in the ciliary portion of the retina, the cylindrical cells of which were extraordinarily well preserved, in spite of the rapid increase of the growth, while, as is well known, such cell-formations are not to be compared in power of resistance to the elastic membrane of Bruch, on the other hand, we see that when once the more malignant stage of the disease is begun, the destructive process may be continued independently by the

other foci of the disease, which are isolated from the main mass.

If we seek, in the sense of Cohnheim, to detect in this case of choroidal sarcoma of the ciliary region a possible connection between the neoplasm and certain complications of development, such connection may be discovered in the folds of the embryonal retina in the locality which corresponds to the ciliary region. The folds, well known to all earlier embryologists since the time of v. Baer, by whom they were held to be analagous to the gyri upon the surface of the brain,* persist later and project further inward in the future pars ciliaris retinæ than elsewhere. A glance at these projections will show that in the recesses thus formed in the corresponding part of the outer surface of the pigment layer,† in the earliest period of development of the choroid an excess of (spindle) cells may be deposited through any slight irregularity. In a clinical aspect the excessive displacement of the vitreous by a relatively small tumor is remarkable. In spite of this, however, the intraocular pressure was relatively increased, though not so exquisitely palpable to the touch.

Explanation of the Figures.

Fig. 2 and 3. Micrometer sections through sclerotic, choroid and the tumor.

Fig. 3. Horizontal section through a part of the tumor, lying somewhat above the preceding.

Fig. 4. Transition of the choroid into the posterior part of the tumor.

* Comp. the exhaustive, profusely illustrated, and excellent treatise by v. Ammon in *Gräefe's Archiv*, vol. iv., 1, p. 93–107.

† Kessler. Development of the eye in the vertebrata; and Würzburg. History of the development of the eye in mammals. These ARCHIVES, vol. v, plate 9, fig. 1 and 3.

SELECTED CLINICAL CASES OBSERVED DURING THE YEAR 1878.

By Dr. J. HIRSCHBERG, of Berlin.*

Translated by Isidor Furst, of New York.

(*Plate VI, and Fig.* 5, *Plate V.*)

1. *Herpes Zoster Frontalis, with Neuro-paralytic Destruction of the Cornea.*

Mrs. D. V., æt. 54, native of Italy, had suffered ten years ago, at Paris, from a slight attack of hemiplegia, with *paralysis of the right half of the body*, from which weakness of the right foot still remained; a week ago, she had a very violent and painful erysipelatous inflammation of the right half of the forehead.

December 17, 1878, when Dr. Daus called me in consultation, there was—precisely to the median line of the forehead—a pronounced swelling and inflammation of the right half of the forehead, of the right upper lid, and of the adjoining zones of the scalp and temple. The entire swollen part was covered with confluent (herpes) vesicles which had shed their epithelium and presented purulent cuticular abscesses. *The right globe was almost blind.* Noticeable were a prominent corrugation of the conjunctiva bulbi, a slight excoriation of the centre of the cornea, and pronounced inflammation of the iris—namely, contraction and irregularity of the pupil, with delicate exudation into its area, so that the fundus could not be examined. The tension of the blind globe was rather increased. The left eye was perfectly healthy.

On the following day, the right pupil was somewhat dilated by atropine; its lower margin was free from the pseudo-membrane which had contracted toward the upper part of the pupil. We convinced ourselves that the greater alterations of the fundus, espe-

* This is a continuation of previous annual reports, the first of which appeared in the *Berliner klin. Wochenschrift*, 1870, No. 44 et seq.; the succeeding ones, in separate pamphlets, 1874, 1876, 1877, and 1878. The number of new patients in 1878 was 3,683; admitted to the hospital, 225; important operations performed, 169.

cially swelling of the optic nerve, could be excluded. Fingers counted with difficulty at one foot; hence S. was considerably less than the degree of opacity would lead us to expect. Conjunctiva bulbi still strongly infiltrated. Status remained the same for about one week. January 2, 1879, I again saw the patient who had left her bed for the first time. The swelling of the upper lid had receded; the cutis was again covered with epithelium, but was quite insensible at the site of the former vesicular eruption, *i. e.*, the right half of the forehead as far as the temple and scalp, the right upper lid, and the right half of the nasal bone—in short, the region well known to the oculist as the seat of ciliary pain. Equally insensible is the cornea of the right eye, likewise the conjunctiva of the globe and of the cartilage of the upper lid; that of the lower lid is less so. The *epithelium is absent* from the greater part of the cornea; the bottom of the excoriation is smooth and transparent, its margin sharp and ragged. In the upper half of the cornea we see some circumscribed whitish patches, in size ranging up to the head of a pin; they are situated so deeply that with oblique illumination a thin, tolerably transparent corneal layer may be demonstrated in front of them. The largest pustule-like patch has a delicate bloody border. The lower third of the anterior chamber is filled with pus, upon which rests a thin layer of blood. The pupil is slightly dilated; with numerous pointed posterior adhesions; not illuminable. Fingers no longer counted.

Continued the eye-bandage which was ordered some days ago, together with instillations of atropine and lukewarm chamomile cataplasms.

January 5th, the corneal excoriation has changed into a deep, smooth, transparent abscess which, at the larger pustule, deepens still more cuplike. The anterior chamber nearly half full of pus; upon it, close to the cornea, two dark streaks of blood. Jan. 15th, the cornea is still quite insensible, its major portion transformed into an abscess which in the main is smooth and translucent, and only in one place, corresponding to a perforation, it is uneven and whitish; hypopyon greatly decreased. Jan. 23d, the corneal abscess is retrogressing; its centre incloses a small prolapse of iris.

February 20th, the cornea is flattened and somewhat shrunken, rather opaque; anterior chamber narrow; the globe very soft. The insensibility of the cornea, conjunctiva bulbi, cutis of the upper lid, temple, and scalp barely decreased.

The description of the present case appeared justifiable to me, as I had never observed a similar one. Also Sämisch (Gräfe-Sämisch, Bd. iv, 1, p. 236) and Michel (*ibid.*, p. 401) in no place mention the neuro-paralytic destruction of the entire * cornea in herpes zoster frontalis. Pacton, the most recent writer on this affection, mentions the fact of the destruction of the cornea, without adducing a satisfactory history of a case.† In our case, the *preceding hemiplegia on the side of the zoster* is of particular etiological interest. (Anæsthesia of the trunk or the extremities was *not* demonstrable.)

Quite noteworthy, too, is the early demonstrated participation of the optic nerve (amaurosis) and of the uveal tract (iritis).

I append two cases of more or less complete *insensibility of the cornea*, coming under observation among very unusual morbid processes.

2. *Ophthalmoplegia universalis, oc. sin truumatica.*

A laborer, æt. 28, was admitted March 28, 1878. A month previously, a steam circular saw, making 2,000 revolutions per minute, had hurled a piece of wood at the left half of the head, after which he remained unconscious for seven hours.

A linear scar, reaching down to the bone, 3½ *cm.* in length, extends from the outer end of the left lower lid obliquely downward to the middle of the cheek. The lower lid is everted. The upper lid hangs loosely downward. The globe cannot be rotated in any direction for more than from one to two millimetres. S.=o, T.—2 ; the globe free from irritation. The cornea is transparent, quite insensible, freely yielding on slightest pressure ; iris dark-green (right, blue) ; pupil widely dilated and immovable. Diffuse bluish opacity in the most posterior part

* *Circumscribed insensibility* of the cornea in the region of the well-known little pustules is frequent enough in the course of herpes zoster, and familiar to every observer ; it contrasts strongly with the normal or even seemingly increased sensitiveness of the parts of the cornea remaining unaffected.

† Du Zona ophthalmique par Marc Pacton, Paris, V. A. Delahaye et Cie., p. 67. L'ulcération peut enfin aboutir à la perforation de la cornée. Le Dr. Galezowski, A. Hybard et Giraud Teulon ont vu la suppuration de l'œil précéder cette perforation. Le Dr. Galezowski . . . a observé un cas de ce genre. L'ulcération de la cornée fut consécutive à un abscès ; . . . les douleurs étaient atroces . . . il se forma un staphylome antérieur.

of the vitreous. A rupture, or at least a traumatic interruption of conductivity of the nerv. opt., oculomot., abduc., and the ciliary branches of the trigeminus within the orbit, had to be assumed; *complete* in the case of the optic nerve and the branches of the trigeminus. The right eye, which formerly possessed excellent vision—in target practice—and apparently unaltered externally and internally, showed S.=$\frac{1}{15}$. Field of vision free, pupil rather wide. This somewhat enigmatic amblyopia disappeared gradually. Dismissed March 31st. April 26th, patient presents a splinter of wood which some days ago had been discharged from the suppurating cicatrix in the cheek; a second splinter, situated superficially, is cut out. July 28th, the œdema of the lids has disappeared, moderate ptosis persists. The right eyeball is amaurotic and free from irritation; it projects more than the left, and can now be slightly rotated in the four main directions. The cornea is quite insensible, and completely transparent. T.—2. The bluish mass which appears stretched in front of the fundus may be interpreted as a pouch-like condensation of the vitreous, in consequence of an internal hemorrhage. The retina in the main is clear—here and there covered with hemorrhages and black streaks of pigment; papilla not visible.

October 6th, as the opacity of the vitreous has grown less, the papilla may be recognized as a snow-white, non-vascular, somewhat irregularly bordered disk; if patient looks upward as far as possible, some isolated retinal vessels and some black pigment can be made out; looking downward, the bluish vitreous membrane can be seen stretched in front of the fundus. Patient, who again follows his avocation, returns for the extraction of a small chip of metal from the surface of the right cornea. November 3d, a small facet has remained at that spot. T.—2. Slight corrugation of the cornea, as after continued bandaging of a soft globe. The least pressure of the lids on the cornea produces a deformity of the pupil. Ptosis slight.

December 22, 1878, about ten months after the injury, the first indication of a neuro-paralytic affection shows itself in a roundish, cup-shaped abscess, about 1½ *mm.* in extent, situated immediately above the lower margin of the cornea; and in a slight opacity and excoriation of the corneal zone above it. There was also pericorneal injection, but of course no pain. Atropine, bandage. The abscess at first makes no progress; January 19, 1879, it is as before. Very obscure sensibility of the trigeminus

has returned, noticeable on roughly touching the conjunctiva bulbi, perhaps also the upper part of the cornea. A single posterior synechia is visible.

Of the oculomotor nerves, chiefly the internus is functionating; the abducens tolerably well. The lower lid is but slightly detached from the globe. The inferior conjunctiva shows œdema, and some symblepharon-like streaks. The globe is almost free from irritation, only the epithelium in the lower third of the cornea is loosened; at the lower margin of the cornea there is a gray, somewhat prominent cicatricial infiltration, with delicate vascular new-formation, and adjoining it a small excoriation. T.—2. Color of iris almost like that of the other side; small posterior synechia of the pupil, which is dilated by atropia. The upper lid is slightly pendulous; the left globe is perceptibly more prominent than the healthy one, and somewhat everted; it can be well abduced, but scarcely lowered at all.

The lower half of the cornea is still quite insensible; its upper half and the adjoining conjunctiva bulbi are but little sensitive. On touching them with strips of paper, the patient indicates only faint, indistinct sensations. An almost microscopic corrugation of the prepupillary part of the transparent cornea seriously interferes with ophthalmoscopic examination.

March 10, 1879, increased pericorneal injection; one of the infiltrations at the lower margin is yellowish and slightly ulcerated; the inferior two-thirds of the cornea somewhat dulled. Insensibility of the cornea unchanged.

In connection herewith I would venture the following concluding remark: Do not deceive yourselves regarding the neuro-paralytic keratitis accompanying complete and incurable paralysis of the fiftn pair! It is sure to come, though late! A long time even after partial cure of the neuro-paralytic affection, complete destruction of the cornea may ensue. In one female patient, in whom, four years after I had proved anæsthesia of the cornea (probably in consequence of a neoplasm on the base of the brain), the ulceration was slowly commencing and leading to a staphyloma with partial preservation of the cornea (comp. *Beitr.*, Heft iii, p. 41), there suddenly occurred, a year subsequently, complete sloughing of the entire cornea! This is

one reason why I am less inclined toward *optico-ciliary neurotomy when the cornea is still preserved.*

3. *Ophthalmoplegia unilat. motor. et sensit.*

An iron founder, æt. 50, presented himself August 6, 1878, with the complaint that he had been suffering for six weeks from diplopia, with gradually increasing divergence of the two images.

Right, *total paralysis of the abducens*, and *mydriasis, with paresis of accommodation.** On both sides Sn. On.

This condition remained unchanged for some weeks, during which potassium iodide was used. On February 16, 1879, patient returned after an absence of several months. The left eye is still quite healthy. The right eye presents the picture of *ophthalmoplegia externa* and *interna*. *a.* The right upper lid drops perceptibly, but may be passably well lifted, synergetically with the left, on raising the line of fixation. *b.* The right globe remains quite steady during the most extensive motions of the left, excepting a very slight rotation around its visual axis (trochlearis —), which occurs with intended downward look. Conjointly therewith the episcleral conjunctival vessels, and also the ophthalmoscopically visible retinal vessels, rotate like the hands of a watch. *c.* The pupil is moderately dilated and fixed. Accommodation is considerably impaired. *d.* At the same time, the whole of the perfectly transparent cornea of the right eye is rather insensible on being touched with a strip of paper. The conjunctiva bulbi is likewise insensible, but not the cutis of the lids, etc.

Otherwise the vigorous man exhibits *no manner of paralytic appearances* or other disturbances. He only complains of somewhat difficult deglutition.

It is well known that A. v. Gräfe (*Arch.*, Bd. xii, 2, p. 265 et seq.) has called the attention of oculists to total paralysis of the external muscles of both eyes. He also observed several cases, especially in cases occurring sud-

* 'Where mydriasis paralytica occurs conjointly with paralysis of the abducens, it is *not at all* requisite to refer the present cause of the paralysis to two different nervous tracts; for Adamück, in three cases among forty-two (in experiments on animals), found the pupil-contracting fibres ramifying, not in the trunk of the oculomotorius, but in that of the abducens." A. Gräfe, in Handb. of Gräfe-Sämisch, Bd. vi, p. 56, note. Our case, of course, testifies against the interpretation according to Adamück. In a second case of paralysis of the abducens, mydriasis of the same eye set in and persisted, while the paralysis of the abducens disappeared.

denly after indubitable and very violent cold; he was inclined to look upon *periostitis basalis* as the cause, but was unable to obtain confirmation of the hypothesis by a post-mortem examination. The results obtained from the base of the skull were negative. Later on, v. Gräfe was more inclined to assume a disturbance of certain functional oculomotor ganglia in the cerebrum as cause of the bilateral ophthalmoplegia.* Förster (comp. *Centralbl. f. Augenhlkde.*, 1878, p. 221) has observed three cases of this nature (paralysis of both oculomotor nerves [exclusive of sphincter], trochl., abd.), with symptoms of bulbar paralysis (paralysis of the upper branches of the facialis), and he correctly located the seat of the affection at the bottom of the fourth ventricle and the aqueduct. A. Eulenburg (Nervenkr., p. 491, 1st ed.) had previously already called attention to the participation of the motor parts of the fifth pair and of the facialis in ophthalmoplegia.

Our case, although at the time strictly unilateral, would still fall within the confines of this affection. Fleming (*Brit. Med. Journ.*, October 10, 1868, quoted by Eulenburg) likewise observed a case of complete paralysis of the oculomotorius, trochlearis, and abducens of the right side. However, under the exhibition of potassium iodide and quinia ferro-citrate the paralysis of the external ocular muscles was cured, but mydriasis and paralysis of accommodation remained. Physiologically, the complication of our case with anæsthesia of the globe is very interesting. We might deduce therefrom, considering the absence of other cerebral symptoms, the hypothesis, that the ganglion of

* In the text and hand books of ophthalmology, even the large one of Gräfe-Sämisch, very few illustrative observations will be found. The text-books on nervous diseases may be consulted to better advantage: A. Eulenburg, in his excellent "Lehrbuch der Nervenkrankheiten" (1st ed., 1871, p. 489), has a very complete chapter on progressive ophthalmoplegia. Comp. also *Zehender's Monatsbl.*, 1872, p. 67 (Michel), and *Berl. klin. Wochenbl.*, 1874, No. 51 (Landsberg). J. Hutchinson's excellent work (*Lancet*, No. vii., 1879) did not reach me until after these sheets had gone to press. He has observed fifteen cases. In one, the post-mortem of which was performed by Gowers, the third, fourth, and sixth pairs of cerebral nerves were atrophied; their places of origin (ganglia), degenerated; the sentive part of the fifth pair atrophic; small patches of degeneration in pons and medulla; resembling the metamorphoses of the anterior horns and spinal nerves in progressive muscular atrophy, etc.

ocular sensibility is in close proximity to that of ocular motility, so that a grouping takes place, more in accordance with the organs than the quality of the nerves.

Of course, the objection might be raised, that an orbital location of the present unilateral affection is not excluded, the more as the so-called *ophthalmoplegia interna, i. e.*, dilatation of the pupil with paralysis of accommodation, has lately been referred by J. Hutchinson (comp. *Centralbl. f. Augenhlkde*, 1878, p. 199) to an affection of the ciliary ganglion. However, the absence of any participation of the optic nerve, or of any indication of exophthalmus, seems to me to be against it; and in March, 1879, paralysis of the *left abducens* set in!

Finally, we might remark that, besides ophthalmoplegia bilateralis externa, Adamück (*Centralbl. f. Augenhlkde*, 1878, p. 73 et seq.) has observed a case of absence of motor innervation of all external ocular muscles, in which both eyes looked straight forward in nearly parallel directions, and could not be spontaneously moved; while after passive motions of the head the eyes for a short time maintained the momentary direction, to return in a few seconds spasmodically to their primary position. Adamück places the location of this affection into the anterior corpora quadrigemina, *i. e.*, the oculomotor centre found by him through experiments on animals.

4. *Cataracta Diabetica.*

Fr. G., æt. 28, was admitted April 8, 1878. For two years past, *diabetes mellitus*, cessation of menstruation, etc. The right eye has been affected for four months; the left has been unable to read *for a week*. Right, fingers at 6″, left 5′. On both sides puncture of the capsule, and later linear extraction by section with lance-shaped knife, 5–6 *mm.* in extent. Expansion without iridectomy.

Result on discharge: S.=$\frac{15}{30}$, black round pupils.

The favorable results which A. v. Gräfe obtained in diabetic cataract by his modified scleral extraction (12 perfect and one partial success in 13 cases), which have been con-

firmed by others, especially by my friend A. Sichel,* and which have been particularly extolled over the flap extraction, have had the effect of causing Gräfe's method to be largely employed even *under the necessary limitation of age:* I used it, for instance, in a patient æt. 33 (*Beitr.*, iii, p. 86), in whom the consistency of the voluminous, bluish-reflecting cataract probably would have admitted of an easy expulsion by the lance-section. The lance-section is performed vertically outward, corresponding to the margin of a moderately dilated pupil; the point of the lance also opens the capsule, and if the lens-matter does not exude spontaneously, it is extracted by the blunt, curved probe inserted into the capsular wound.

5. *Retinitis ex Hæmophilia.*

In February, 1878, a colleague of mine, Dr. J. Pincus, sent me a young farmer, with the diagnosis of retinitis, from affection of the kidneys. Heart and kidneys, however, are healthy, the patient being vigorous throughout, but hæmophilic, like the rest of his family. When a boy, he had bled profusely after tooth extraction; also, later, after every injury, and had suffered two or three times from spontaneous hemorrhage from the bladder. The right eye has been blind for fourteen years, in consequence of a stab-wound; the left eye, somewhat weaker since Christmas, 1877, has improved within the last four or five days.

The right eye squints outward, has a large corneal cicatrix, shrunken cataract, etc. The left is externally normal. The ophthalmoscope shows the optic papilla strongly injected and covered with small hemorrhages; its lower border is veiled by a whitish opacity which gradually shades off into the adjoining retina. The arteries are narrow, the veins greatly distended and partially covered by encircling hemorrhages. Numerous small roundish specks of blood are demonstrable in the periphery of the retina. No visual disturbance. A few weeks later, *status idem.*

It may be neither new nor surprising that sanguineous effusion into the retina occurs in the hemorrhagic diathesis, although the opportunity for immediate observation may

* Comp. *Centralbl.*, 1878.

be rare.* Yet the great distention of the retinal veins, and the peculiar form of the hemorrhagic retinitis, appear to me instructive.

6. *Embolism of the Central Retinal Artery.*

A man, æt. 74, presented himself December 2, 1878, with the statement that he had observed, two weeks previously, a sudden darkening of the right eye, when reading in the evening. The eye has been blind since. The vigorous patient has rigid arteries; at the apex of the heart a systolic murmur, besides the first sound, is audible.

Left: Sn., On. Right: All the retinal arteries are filiform on the papilla; the point of confluence alone is broader, with central reflex-streak, and pulsates on pressure upon the globe. The veins are well-filled, excepting the nasalis inferior. The latter commences filiform on the papilla, passing over the retina it grows broader than the other corresponding veins, and its sheath is filled with delicate hemorrhages; then again for a short distance it grows filiform, and finally expands again. The optic nerve is pale, the retina between nerve and the centre milky-opaque, the macula appears brownish. On the evening of December 10th, patient became blind in the left eye for the space of ten minutes. The following morning no trace of this attack can be discovered even with the ophthalmoscope.

Similar attacks, lasting from one-quarter to one-half hour, recurred at the end of December, 1878, and in the middle of January, 1879. These, taken alone, testify in a certain measure against the assumption that the symptomatology of embolism of the retinal artery may be caused by hemorrhage into the sheath of the optic nerve (comp. *Beitr.*, iii, p. 69).

7. *Scotoma centrale hereditar.*

In volume vii of the ARCHIVES, Dr. Pufahl has reported the history of a young man, from my clinic, who showed, *without known*

* The fact was not unknown to A. v. Gräfe. Leber (Gräfe-Sämisch, Bd., v 2, § 26), among the causes of retinal hemorrhage, does not *directly* include hæmophilia. On the other hand, Galezowski (*Traité*, 2d ed., p. 677, 1875) states to have found extensive hemorrhagic spots in the retina, in a case of hæmophilia.

cause, bilateral scotoma centrale station., with normal extension of the visual field, whitish papillæ, and Sc. about $\frac{1}{18}$. On inquiry, the condition has remained unchanged up to the present. In 1874 we had no reason to assume the effect of hereditary influences in that case of exquisite scotoma from affection of the optic nerve. However, on April 6, 1878, his cousin (son of his mother's sister), æt. 19, presented himself on account of a visual disturbance existing since March of the same year. On both sides counts fingers at the extreme length of the room, *without ophthalmoscopic abnormities.* Patient did not return until December 3, 1878. The visual disturbance has considerably increased. Right, fingers at 5′; left, at 2½′. Field of vision on both sides of normal extent, with very large central scotoma (up to 20° radius, with somewhat varying shape on repeated measurements). Blue is recognized eccentrically, red designated as blackish, green as gray. The optic nerve on both sides appears atrophic. The left eye is turned upward on attempting fixation.

After inunctions, sudorifics, Heurteloup's, etc., only a scant improvement was obtained. On February 19th, fingers both sides at 15′, Sn. XVI at 6 to 8″ with difficulty. The general condition is satisfactory, only the sensorium acts rather sluggishly. (Comp. Leber, Krankh. der Netzhaut, in Gräfe-Sämisch, Bd. v, 2, p. 824. Pufahl, *Berl. Klin. Wochenschr.*, 1866, No. 20. Hirschberg, *Beitr.*, iii, p. 75.)

8. *Neuro-retinis Specifica.*

Mrs. G., æt. 23, is sent to me July 8, 1878, by Dr. A. Baginsky.

Anamnesis.—Patient suffered, five years ago, from dropsical symptoms, although no affection of the heart or kidneys was demonstrable. She is now in the third month of utero-gestation, and, excepting the visual disturbance on the left side, is healthy. The right eye has always been weak; the left suddenly grew weak eight days ago, and blind four days since.

Right, Sn. 2 at 6″. Visual field free; On. Left, S.=$\frac{1}{\infty}$. An intensely white mass, 3–5 *mm.* in diameter, is deposited on and around the papilla. The papilla is completely covered, and only recognizable by a slightly grayish-red tint admixed to the white opacity at that place. The border of the large white spot is rather clearly marked. Within it, larger retinal vessels become prominent here and there for some distance; they are not only on

the surface of the retina, but wind perpendicularly towards it, obviously through a solid mass pressing the retina forward. Close to the papilla toward the outside, a delicate rete mirabile of blood-vessels is visible in the white opacity. Nearly in the centre of the retina we see a stellate figure; at the periphery, small hemorrhagic spots; below, a large bluish spot behind the retinal vessels. Heart and kidneys seem healthy. Syphilis is denied, but there is a papulo-squamous eruption. After the condition had remained unchanged for a week, *mercurial inunction* was commenced. *This caused immediate improvement.* July 24, 1878, after using twelve times 1.5 *gms.* ung. hydrarg. within four days, the central region of the retina has cleared considerably. The medial half of the papilla is again recognizable as such; the lateral half is still obliterated by the retinal opacity; the latter is no longer quite as prominent. The whole picture now resembles an ordinary, strongly marked neuro-retinitis; stellate figure, and bluish-white patch below, still persist. Counts fingers at 8′ eccentrically, not below. July 31st, the opacity on and around the optic nerve has greatly decreased; the central stellate figure is rather more distinct; the large bluish-white patch has split into numerous circumscribed spots. A second and third course of inunction were instituted. August 7, 1878, after using thirty-six times 1.5 *gms.* ung. hydrarg., the left eye recognizes Sn. CC. at 15′, and with + 6, Sn. XIII at 6″. Papilla clearer, only from its external *upper* margin a small opacity extends into the retina; stellate figure and group of spots unchanged.

September 13th, S. same as on August 7th; papilla not quite clear yet. Stellate figure has nearly disappeared. Below the papilla, numerous yellow spots, increasing toward the periphery.

March 11, 1879.—Dr. A. Baginsky kindly informed me that patient was delivered December 28, 1878 of a child which had died, February 18, 1879, of indubitable congenital syphilis. The mother at the time was free from any other syphilitic symptoms.

Right, Sn., On., Left, Snellen 3 at 6″; defect of visual field from below up to 20° from point of fixation. Papilla still dull, lateral half whitish, hiding the cribriform plate, medial half grayish-red; border indistinct; metamorphoses of the adjoining retinal pigment. Below the papilla, toward the periphery, numerous, very small, faintly defined, whitish-blue, non-confluent specks which, of course, have no bearing on the defect of the visual field.

9. *Ring-scotoma in Specific Retinitis.*

A physician, who fifteen months previously had infected his finger, and subsequently had suffered from secondary symptoms (abscess of pharynx, tongue, etc.), presented himself on account of recent visual disturbance of the right eye. Left, Sn., On., M. 3 D. Right −3 D, Sn. LXX at 15′; Sn. 1½ at 10″ with great difficulty. Limits of visual field normal; paracentral scotoma, forming a ring surrounding the point of fixation at a slight distance (3–8°) from it, having a breadth of 10° maximum, but remaining open toward the macula lutea. Delicate diffuse retinitis.

My clinical journal has the notes of two other cases of ring-scotoma in diffuse specific retinitis.

10. *Lead Amaurosis.*

February 9, 1878, there was brought to my polyclinic a pale girl of seventeen, who had worked for four years in a type foundry, and was attacked November 3, 1877, with lead-colic, headache, and visual disturbance. The menses had been suppressed since August, 1878, and returned only two weeks ago. Right, S.=0, Left, $=\frac{1}{\infty}$. Papilla on both sides bluish-white, retinal vessels contracted, region of the macula on both sides occupied by group of bright points. Between papilla and macula, delicate whitish, vertical, somewhat anastomosing streaks.

Lead-amaurosis from papillitis (whitish choked disk) I found incurable also in other cases; while once diffuse retinitis (resembling the picture of specific r.), from a like cause, could be cured by appropriate treatment.

11. *Acute Amaurosis Potatorum.*

This is a recognized affection, but its clinical cases are few, especially when compared with the large number illustrative of chronic amblyopia ex abusu spiritus.

July 2d, the driver H., æt. 61, was brought to me. He has been drinking liquor regularly for forty years, now consumes daily above one quart, besides two or three bottles of beer; smokes but little. Both sides count fingers at 1′ to 2′, eccentrically. Papilla somewhat pale, vessels rather contracted. Abstinence recommended (respectively enforced), and indifferent remedies prescribed. July 22d, fingers at 4′. July 28th, fingers at 12′.

12. *Atroph. N. Opt. Stationar. e Neuritide.*

All observers know sufficiently well, and especially since A. v. Gräfe's famous lectures (1865, Engelhardt, *Zehender's Monatsbl.*) it has been clearly understood, that the whitish discoloration of the optic nerve does not admit of any certain deduction either of the temporary condition or the future development of the visual acuteness. Hence the numerous communications regarding the cure of atrophy of optic nerve no longer gain any credence, inasmuch as the cured or stationary cases are ordinarily referred to benign visual disturbances with central scotoma, or to an optic neuritis developing behind the globe.

Aside from mistakes of judgment on account of too short observation,* cases of the latter order come here mainly under discussion, as the former (scotomatous visual disturbances) may be excluded from the start by moderately careful examination of the visual field.

Of course, if visual disturbance, limitation of the visual field, whitish discoloration of the optic papilla in both eyes, are present *without any inflammatory* alterations of the fundus, really time† alone can decide with certainty on the final result. It was very instructive to me to have some cases under observation for years.

a. A young man presented himself January 11, 1871, with the statement that his right eye had become weak *eight years ago* after exposure on the railway, but that the sight of the left eye had also become impaired.

Bilaterally M.; right, Jäger 11; left, Jäger 2 at 3″. Bilateral considerable limitation of visual field; right, the lateral-upper quadrant is almost entirely absent; left, little more than the medial-upper quadrant is left. White discoloration of the papilla on both sides.

July 22, 1878, that is after 7½ years, acuteness of vision, visual field, and ophthalmoscopic condition are absolutely unchanged.

Result.—A visual disturbance of both eyes with central scotoma,

* Particularly in the slowly progressing atrophy of the optic nerve which, rarely as women generally are attacked with amaurosis, seems to occur in them relatively more frequently than in men.

† Klin. Beob., p. 68.

caused by "exposure," accompanied by considerable narrowing of the visual field from the periphery, and by white discoloration of the optic nerve, has remained, according to patient's statement, unchanged for at least fifteen years, and according to direct observation, for at least seven years and a half.

b. July 6, 1875, J. S., æt. 24, was admitted with bilateral granular atrophy of the conjunctiva, accompanied by distortion of the lids, trichiasis, and small corneal abscesses.

The ophthalmoscope disclosed a yellowish-white discoloration of the optic nerves. Bilaterally fingers are counted at 12′, with + 6 D, Sn. VI is read at 4″; on both sides there is a considerable concentric limitation of the visual field, especially from within. Anamnesis shows that patient had, in his fourteenth year, passed through a grave attack of general disease, followed by impaired vision. Since then, unchanged, except the recent exacerbations of the corneal affection. The general health is quite satisfactory—no nervous symptoms; patellar tendon-reflex marked. The relapses of the external inflammation caused the patient to remain under observation up to the present time—nearly four years. The visual field showed, on repeated careful tests, not only no decrease, but rather an increase. In Fig. 1, Plate VI, COD designates the visual field of the right, COS that of the left eye, drawn in orthographic projection. L is the lateral, M the medial side; *m*, Mariotte's blind spot; *wn*, the normal limit of the visual field for white; *bn*, for blue; *rn*, for red; *gn*, for green, if quadrangular pieces of paper, 10 *mm.* long, at a distance of 12″, are employed for the test. The heavier lines are the limits of the individual field of vision of our patient on May 15, 1878; W, for white; R, for red; G, for green. C designates the eccentricity up to which Sn. C. could be recognized at 1′.

13. *Chorioretinitis Latens.*

a. Railway official H., æt. 51, first came on November 2, 1871, on account of impaired vision of the *right* eye existing for eleven months (darkening of the centre of visual field and micropsia) which he had contracted during the war, as engineer of a sanitary train. Patient is healthy, aside from a "rheumatic" inflammation of the knee-joint. Bilaterally On., left Sn., right CC. at 15′, $+\frac{1}{10}$″ Jäger 3–4 at 8–10″. Central scotoma (indistinctness) of 12–18° radius (outwards, but below only 4–5°); limits of visual field normal. Although the one-sidedness of the scotoma and the accom-

panying micropsia were in favor of a retinal location of the affection, the assumption could not be raised to a certainty with the ophthalmoscope, despite regularly repeated examinations. But the treatment was effective, consisting of the internal use of potassium iodide, mercury bichloride, and the subcutaneous injection of strychnia. October 18th, right, Sn. XL at 15′, $+\frac{1}{10}$ Jäger 1. The flat scotoma had brightened in its centre and had changed into a ring which on November 9, 1871, had already divided into three separate pieces by partial clearing; on February 23, 1872, only one of these remained; but on April 4, 1872, patient could still denote, on the visual-field table, the place where the scotoma had been, so that a slight metamorphosis in the baccillar-layer in the centre of the retina must be assumed.

Satisfied with the result, patient withdrew from observation, and did not return until more than six years later, July 22, 1878, on account of a visual disturbance of the *left* eye, stated to have existed for three weeks.

Left, Sn. CC. at 15′, with difficulty, +6 D, Sn. 1½ at 6″ with great difficulty. In the visual field the inner-inferior quadrant was entirely absent (COD, Fig. 2, Plate VI); the defect reaches immediately to the point of fixation; in the other directions the field of vision is unimpaired and free from isolated interruptions. *Right*, +1 D, Sn. XV at 15′; +3 D, Sn. 1½ at 12″. The visual field has unchanged external limits, but a large pericentral ring-scotoma remaining open toward the median line; in its neighborhood numerous small defects. (See Fig. 4, COD, Plate VI, S. [with continuous border-line, shaded surface] indicates the larger scotoma; A is the external limit of the visual field on July 22, 1878; B, the same at the later test on October 16, 1878. Where A, B, is marked, the external limit has remained unchanged.) The ophthalmoscope shows, right, numerous crowded, partly grayish-white, partly rose-colored spots between the optic-nerve entrance and the retinal depression which has remained free, exactly corresponding to the scotoma-drawing. Hence we are justified in referring *the scotoma observed seven years ago to chorioretinitis centralis latens.* In the periphery, too, similar spots appear, some of them black. The optic nerve is unchanged. *Left*, in the first place, an exquisite *synchysis scintillans is demonstrable, which assuredly did not exist seven years ago.* Moreover, in the periphery, some bright patches of old so-called chorioretinitis; then some recent ones in the central region, and a delicate retinal opacity proceeding from

the whitish optic nerve. Finally, the superior temporal artery is thread-like and bright; the corresponding vein decidedly varicose and *partially* bordered by exceedingly delicate bright streaks. The urine is free from albumen and sugar; patient, excepting the visual disturbance, is quite healthy.

We have yet to mention that he complains of scintillation; that, on binocular fixation, the sector-like defect of the left visual field, but not the scotoma of the right, disappears to him. Besides, the micropsia of the right eye still persists. The letter *M* of Sn. CC. at 15′ appears to him, on alternate view with the right, with the left eye, and with both, as 1 : 2 : 1½.

Patient was treated with inunctions, then with sudorifics in a darkened room, later received Heurteloups, potassium iodide, etc. The central visual acuteness of the left eye, in the course of three months (October 16, 1878), became equal to that of the right, the border of the sector-like defect moving away from the point of fixation by a few degrees (B, Fig. 2, COD). But soon a deterioration on the right side set in: November 17, 1878, *right*, LXX at 15′; +3 D, Sn. IV at 10″; the central scotoma reaches the point of fixation from the lateral side. (See in Fig. 2, COD, the interrupted stroke border-line of the scotoma.) Large central retinal hemorrhage. Soon the scotoma, right, crossed the point of fixation toward the medial side: fingers at 15′; +6, Sn. X to XVI with difficulty; a grayish-blue infiltration with hemorrhages covers the centre of the retina. (January and February, 1879.)

On February 25th, patient complains of black streaks lying in front of the left eye toward the nose. The ophthalmoscope shows laterally from the optic nerve huge vermiform, somewhat branched, dark brown-red streaks of blood in and in front of the retina. Ferri sesquichloridum. At the beginning of March, they have disappeared in the main from the retina, by partial absorption and by sinking low into the vitreous.

Of the highest interest seems to me the fact that, in an apparently non-dyscratic, exceedingly vigorous man, a chorioretinitis acquired by fatigue and exposure may run its slow and somewhat changeable course through a number of years.

In order to further elucidate the conception of a *latent choroiditis* (A. v. Gräfe) or chorioretinitis, I shall briefly add two older histories.

b. Harness-maker Z., first presented himself May 30, 1872, complaining of scintillations and seeing of flakes. Sc. and Se. normal, as was the fundus, even after artificial mydriasis. Only slight vitreous flakes are demonstrable. Rest of the eyes and antiphlogistics did not remove the trouble, but a course of inunction did (from August 14 to September 2, 1872). Syphilis could not be positively proved. After patient had, later on, repeatedly presented himself, and the fundus (even after mydriasis) always been found free, he returned, after a prolonged absence, on October 28, 1874, complaining that of late he had again been more disturbed by seeing flakes. Both eyes read smallest print; on both sides, in the lower part of the visual field, there is an insular scotoma; right, besides, there is a similar one above, and a sector-shaped limitation of the visual field below-inward, approaching to 25° from the point of fixation. On both sides, roundish flakes and delicate membranes in the vitreous. Both papillæ normal, retinal vessels rather contracted. Bilaterally, large bright patches (decoloration of retinal epithelium) especially above; smaller ones in other directions, exceedingly delicate ones in the central retinal region, which, particularly on the right, come threateningly close to the fovea. Sublimate, Heurteloups, etc.; December 7, 1874, second course of inunction, by which subjective improvement is obtained. But on January 29, 1875, there is, right, a ring-scotoma which below-inward directly passes into the sector-like defect.

c. Florentine K., æt. 24, presents herself October 16, 1869, on account of visual disturbance of the right eye.

The left eye is normal; the right reads only Jäger 8 at 6″, and has a limitation of the visual field inward and above-inward. The ophthalmoscope here shows *exceedingly delicate* brownish patches in the periphery of the fundus, especially below-outward, some also in the central region. Syphilis was probable. Repeated course of inunction causes marked improvement. Jäger 1 is read, the limitation of the visual field is disappearing. On the other hand, the patches of decoloration are becoming more distinct; they represent whitish spots bordered by black streaks or covered with dots. January 15, 1870, while the vision of the right eye remains improved, the alterations in the fundus are becoming more and more distinct; small bright spots with black zones or centres are visible already at a slight distance from the papilla, which is normal, and near the centre of the retina; in the periphery, how-

ever, there are large white patches, within the confines of which choroidal vessels now have become plainly visible here and there, and on the decolored places there are the most manifold black spots and trails. In November, 1872, *i. e., more than two years after the onset of the affection*, the left eye is normal, the right reads Jäger at 6″, and is free from palpable limitations of the visual field. On the other hand, there exist some defects of the field of vision in the neighborhood of the point of fixation. The pigment alterations are now spread over the greater part of the fundus; *the pigment lies partly in front of the retinal vessels.*

14. *A Fistula of the Lachrymal Sac*

which has persisted as a capillary opening for two years, despite a regular sounding of the lachrymal duct, may well be considered as not curable spontaneously. Galvano-cautery has been much recommended (also electrolysis, comp. *Centralbl. f. Augenhlkde*, 1877, p. 75). I would like to emphasize that the very handy Paquelin's thermo-cautery has furnished me instant and lasting effect. The sound is introduced into the lachrymal duct in the ordinary manner from above, and a special burner,* bent at right angles and ending in a pointed beak, is inserted into the capillary opening until it touches the sound.

15. *Mumps of the Lachrymal Glands, Dacryadenitis simplex bilateralis.*

Inflammation of the lachrymal glands is so rare that v. Arlt, in his Lehrbuch, openly confessed (1853) never to have seen it. Most of the cases communicated as dacryadenitis belong to the purulent class. Also in my statistics of 22,500 cases, there is *one* case of dacryadenitis suppurativa.

Of the non-suppurative acute dacryadenitis, Schirmer (Gräfe-Sämisch, Bd. vii, p. 6) has but three cases to report. The chronic form, we may parenthetically remark, is not so excessively rare, but generally it is secondary; it originates in scrofulous patients with protracted corneitis and profuse lachrymation; a reddish tongue-shaped swelling with granular surface becomes visible between the upper lid and the

* Manufactured by Thamm, Berlin, Charitéstr. 4, according to my directions.

eyeball toward the outer canthus, when the patient looks downward and the physician raises the lid. This condition was well known to Desmarres, Sen.,* and A. v. Gräfe; they were in the habit of puzzling a learned visitor of their clinics with it, at times.

Our case of *dacryadenitis acuta simplex* (non-suppurative), after the analogy of bilateral simple parotitis, may be designated as *mumps of the lachrymal glands*, without thereby implying a parallelism of the former rare with the latter frequent affection of the glands.

October 18, 1878, Dr. Zielenziger, of Potsdam, sent to me a girl of fifteen, otherwise healthy. Bilaterally, swelling and injection of the upper lid, no chemosis or secretion. Sn., On. On both sides may be felt, in the region of the lachrymal glands, a slight prominence sensitive to pressure.

On October 19th, the palpebral swelling is more pronounced; slight chemosis is visible at the outer canthus. On both sides may be felt, between the middle and the lateral end of the upper orbital margin, an elastic, slightly nodular tumor, leaving no doubt of the existence of a dacryadenitis. Warm poultices, potassium iodide. October 21st, the chemosis has increased. From above, a fold of the conjunctiva bends over the upper half of the cornea. The nodular swelling of the lachrymal gland is increasing. Fluctuation not demonstrable. On October 22d, the retrocession of the swelling commences; chemosis only outward, no longer upward. In the succeeding days the improvement continues. October 28th.—While the swelling, left, remains barely perceptible, a tongue-shaped swelling may be felt in the right, which becomes plainly visible as a red, nodular mass between lid and eyeball, when patient looks downward while the physician raises the non-swollen upper lid. In the following days, left side unchanged; right, rather more prominent swelling of the anterior flap of the lachrymal gland. November 5th.—The right globe is plainly directed downward; its upward motion is limited. Corresponding diplopia. Patient returns home. According to a written communication from her father (March, 1879), condition remains almost unchanged.

* Comp. *Desmarres' Augenheilkunde*, edition of Seitz, 1852, p. 668.

16. *Vaccine Vesicles on the Lids*

are extremely rare. In my journal one case is recorded which had been treated in the clinic by my former assistant, Dr. Pufahl, during my absence.

A man of 45 was admitted on August 17, 1878. He had played with his children, who had recently been vaccinated. Both lids of the left eye are tensely swollen. In the middle of the free border of each lid are two pustules, and one is situated at the attached border of the lower lid. The pustules are round, 3 to 4 *mm.* in diameter, and in their centres contain a whitish-yellow point the size of a pin's head. Conjoined therewith are pain, lachrymation, and chemosis which covers the corneal margin. August 18th, the pustules extend more on the mucous surface. Atropia. August 19th, marginal infiltration of the cornea. The vesicles were opened. August 20th, the swelling begins to recede; copious conjunctival secretion. August 23d, chemosis and marginal infiltration have disappeared; patient discharged. Michel (Gräfe-Sämisch, Bd. iv, 1), does not mention this occurrence.

17. *Exophthalmus from retrobulbar Suppuration. Spontaneous Cure.*

A boy of seven months was presented on February 18th, on account of an exophthalmus of the right eye, existing for one week. The globe is entirely in front of the orbit. The papilla appears grayish. February 20th, the exophthalmus has almost completely disappeared. The preceding day there was a sudden effusion of pus covering the whole face, which repeated itself several times. The child is quite lively again. In the swollen bulbar conjunctiva, close to the caruncle, may be seen a yellow point of pus, but which cannot be pressed out.

18. *Anophthalmus Congenitus Sinister,*

observed in a patient of nineteen. In the depth of the left orbital funnel a whitish body, the size of a pea, moves under the conjunctiva, synergetically with the motions of the other eye. Height of the orbital opening, 35 *mm.*, right, 40 *mm.*; breadth 37 *mm.*, right, 40 *mm.* Breadth of palpebral fissure from the lachrymal point, 20 *mm.*; right, 30 *mm.*

19. *Amaurosis Congenita from Microphthalmus.*

April 20, 1878, a girl of thirteen weeks was presented; she was well developed, but her eyeballs, though well formed, were too small. Horizontal corneal diameter on both sides about 5 to 6 *mm.* Right, coloboma of iris below-inward, and persisting pupillary membrane. Left, luxation of the opacified lens downward; from there a persisting hyaloid artery extends to the fundus, which shows an extensive decoloration (coloboma).

The child continued to develop; the eyes grew somewhat larger, but no perception of light could be discovered. Parents perfectly healthy.

Ocular Tumors.*

20. *Sarcoma Choroidis.*

Mrs. R., æt. 62 (whom I have known for years as a healthy, lively lady, as I operated on her son in 1871 for traumatic cataract, and treated her grandchild, in summer of 1878, for corneitis), was turned over to me on November 3, 1878, by Dr. Stadthagen on account of some trouble in her right eye.

Patient did not think she was troubled with any ocular affection, but had observed, for the past six weeks, a slight limitation of the visual field of the right eye on the nasal side. Each eye independently recognizes Sn. XXX at 15′, and with appropriate convex lenses reads the smallest print.

The visual field of the left eye is normal; that of the right shows a limitation on the medial side up to 10–12° from the point of fixation, but in other directions of normal extent. The left eye shows no manner of alteration; the right, however, externally quite free from irritation, encloses, immediately behind the transparent lens, a roundish, reddish, large tumor, having only a few streaks of pigment, springing from the lateral half of the choroid between equator and ciliary body, and lifting the retina with it. The latter surrounds the apex of the swelling like a narrow cap, and posteriorly bends in a short arc to the rear part of the fundus, which, inclusive of optic nerve and macula, appears quite normal. Directly outward below, some episcleral veins are strongly developed, the tension slightly increased.

* A portion of the observations belonging under this head, glioma ret., tuberculos. conj., etc., I have left to my assistant, Mr. Vogler, for publication.—See next article.

The necessity of sacrificing the still functionating eye being at once evident to myself, to Dr. Stadthagen, and to my resolute patient—whose sister had died of cancer of the stomach—the enucleation was performed as early as November 6, 1878, in presence of Dr. Stadthagen, and the globe immediately opened. The tumor (well delineated by Mr. Vogler, Plate V, Fig. 5) was found at the designated spot, and consisted, as indicated before, of two lobes, and was white, with a pigmented crest. Retina adherent anteriorly and above, posteriorly descending to the normal level in small folds; papilla, optic nerve, and sclerotic normal.

It is a white, large-celled sarcoma, with large nuclei (0.008–0.012 *mm.*) and distinct stroma. A total section shows a roundish neoplasm springing, with a somewhat narrowed basis, from between two wing-shaped processes; one of them is a gradual choroidal thickening, the other a melanotic swelling of the ciliary body. The main tumor is firmly united to the sclerotic and also to the retina.

21. *Oil Cysts of the Orbit.*

(Comp. Verneuil, *Centralbl. f. A.*, 1877, p. 51.)

March 7, 1868, Mr. S., æt. 24, from B., came on account of a tumor upon the right eye, which had existed from childhood and increased up to the present time. Behind the right upper lid, at the junction of the nasal and frontal bones, thence extending into the orbit, is a soft, fluctuating swelling the size of a cherry. Pressure will not evacuate it; it is no encephalocele. It adheres to the bone, and is pronounced a deep-seated dermoid. An explorative puncture evaporates a yellowish, oily liquid, congealing immediately, and showing the tenacity and glittering quality of hardened goose-grease. With the microscope we recognize therein cells, nuclei, detritus, scaly masses and fat-granules, but chiefly free fat-drops. The chemical analysis kindly made by Prof. Salkowski proved that he had to deal with nearly pure oil.

March 12th, the incision into the cyst evacuates, besides oily fluid, a yellowish granular mass. March 20th, extirpation of the cyst which is fastened to the nasal bone. At first healing occurred, but later the middle of the wound reopened, with slight suppuration. April 24th the fistula is completely cicatrized. Discharge.

CONTRIBUTIONS FROM DR. HIRSCHBERG'S EYE-CLINIC.

By E. VOGLER, M.D., Assistant Surgeon.

Translated by Isidor Furst, of New York.

(*With Plate V, Figs. 6 to 8.*)

A Case of Glioma Retinæ, with a Synopsis of the Literature of Glioma during the last Ten Years.

I.—August R., æt. 4 years, from Neu-Celle, near Frankfort-on-the-Oder, was brought to Dr. Hirschberg's eye-clinic on October 20, 1878. According to the anamnesis, the father first noticed an altered appearance of the left eye four weeks ago.

Status præsens.—The right eye is normal; the left, free from irritation, but blind. The pupil is dilated by atropia. Behind the transparent lens even the naked eye can see a pronounced golden yellow reflex, of a color so purely metallic as is not very frequently * observed in glioma. Further may be distinguished by the unaided eye—of course better with the ophthalmoscope and focal illumination—rather close behind the perfectly transparent lens, large, nearly spheroidal elevations of a whitish-yellow, and on the lower side a golden yellow color, with smooth surfaces, across which dilated and tortuous vessels of the retinal type and some others of recent formation are passing. The tension of the globe is evidently increased.

The enucleation was performed on the 21st of October, as the diagnosis—"glioma retinæ"—was positive. The cut-surface of the stump of the optic nerve appears white and normal throughout. The globe, freshly divided in a horizontal plane, shows a purely retinal glioma of typical appearance (see Figs. 6 and 7).

* Comp. *Archiv f. Ophthalmologie.* Bd. xv, 2, 109.

The greater part of the retina is replaced by an encephaloid new-formation which has about the size of a small walnut. The external surface is lobulated; the cut-surface of an exquisitely encephaloid consistence; reddish gray. The anterior surface lifted into elevations, though smooth throughout (invested with the limitans interna), shows below the rather plentiful blood-vessels which appear dilated, partly dichotomously branched, partly tortuous, even convoluted—especially below, a yellow layer as of fatty degeneration, obviously formed by the confluence of yellow spots the size of lentils and less. At the border of the tumor proper, in the still adherent, and not materially thickened anterior retinal zone, similar closely-packed yellow spots are found. On the lower side the alteration reaches nearest to the ciliary body. On both sides of the opened globe, in front, one-third, respectively one-fourth, of the retina is soft and adherent. The tumor continues through a pedicle into the optic nerve which appears not thickened. October 30, 1878, recovery having progressed regularly, the little patient was discharged. He returned the first time March 10, 1879, *i. e.*, nearly four months after the operation, in excellent health, and a careful examination failed to show any trace of a relapse.

The microscopic examination of the retinal tumor revealed glioma structure throughout: round cells with relatively large nuclei, embedded in an exceedingly delicate network of the thinnest fibres, and numerous blood-vessels of the most varying calibre; here and there, besides, granular fat-cells. The medial portion of the retina is completely replaced by the tumor, the limitans interna is preserved. In the lateral part and on the borders of the tumor, an indication of lamination is still present, but it can no longer be positively made out from which granular layer the tumor started. The optic nerve shows no trace of gliomatous degeneration; the lamina cribrosa, likewise, is not infiltrated with cells nor crowded backward. At the place where the central retinal artery enters the interior of the globe, we find, in its nearest proximity and along its course, the first aggregations of cells equal in structure to the glioma cells. (Perhaps the glioma cells immigrated into the perivascular lymphatic spaces? Comp. Dreschfeld, Case 46, infra p. 386.)

The remaining parts of the eye which microscopically appeared normal, showed, even under the microscope, no pathological alteration. Hence our case warrants the prognosis of an almost certain permanent recovery (comp. Pufahl on Enucleation, Hirschberg's Beiträge, Bd. ii, pp. 34–39).

II.—Ten years having now elapsed since Hirschberg, in his monograph on retinal glioma, comprehensively described the picture of this affection in accordance with the older investigations of Wardrop, Lincke, and the more recent ones of Virchow, A. v. Gräfe, Knapp, and himself, and gave the entire literature known up to that time, it might, perhaps, at present appear justifiable to collect the observations since added, and to inquire: 1st. Whether the axioms then formulated have been confirmed by more recent observations; 2d. Whether modifications, and 3d. Whether any additions to the stock of our knowledge on this subject have to be recorded. A task of that nature may be performed the more readily, as, thanks to Nagel's excellent annual reports (1870–1876 incl.) and the *Centralblatt für Augenheilkunde* (1877 and 1878), the collected material is at hand.

A., 1870.

1. Iwanoff, Obs. sur l'anatomie pathologique des gliomes de la rétine. *Journal de l'Anat. et de la Phys.*, p. 225. Comp. *Arch. für Ophth.*, Bd. xv and Markschwamm, p. 91.

2. Hirschberg and Happe (*Arch. für Ophth.*, Bd. xvi, 1, p. 297) communicate a case of retinal glioma in which the tumor had developed, not on the external surface of the retina but on the inner surface into the vitreous space, in the manner first explicitly described by Iwanoff. (*Glioma retinæ endophytum* is rarer than glioma exophytum; clinically, the surface of the tumor projecting into the vitreous in glioma endophytum is uneven and ragged; in glioma exophytum it is smooth and roundish, but there are no essential pathological differences between them.) The neoplasm seemed to have sprung from the pars ciliaris and the retinal parts immediately adjoining. The tumor confined itself to the anterior section; the posterior half of the globe was but slightly altered; the choroidal tract not yet affected. The disease was congenital, and six months later occurred also in the other eye.

A year after the enucleation there was so far no relapse in the first eye.

3. Hirschberg (*Monatsblätter f. A.*, 1870, p. 196) describes an eye extirpated by Katz, in Essen. Here the tumor contained, besides densely crowded small, round cells, a comparatively ample fibrillary network, and spindle-cells of considerable size—in some places in large numbers. The choroid throughout but slightly thickened; optic nerve normal. The tumor was removed in the stage of glaucomatous increase of tension.

4. Schiess-Gemuseus (*Ibid.*, p. 213) describes a case in which the enucleation was performed in the first stage. The swelling was still confined to the retina. One year later no relapse. Otherwise the ordinary appearances.

5. Fano (*Union Méd.*, 1870, p. 70) extirpated an encephaloid of the retina, in which the choroid was healthy, excepting a spot the size of a pin's head; optic nerve normal. No relapse six months later.

B., 1871.

6–8. Hirschberg (*Arch. of Ophth. and Otology*, Bd. ii, 1, 1, pp. 221, 227, 234), two cases of retinal glioma in the first stage, with description of the specimens.

a. In the first case, the tumor was still entirely confined to the retina, although it filled almost the whole vitreous space. The central part of the retina was nearly completely replaced by the tumor substance; the lateral part was only partially thickened and studded with numerous glioma nodules, especially at the external surface. Here only a trace of lamination was preserved. Three or four weeks after the first occurrence of the bright reflex from the pupil, the eye was removed; no relapse after several months.

b. In this case, the tumor was also confined almost exclusively to the retina. In the choroidal epithelium only, rather numerous small white points—microscopic glioma-germs. Choroidal stroma quite normal; optic nerve intact. Here, too, the morbid appearance was first observed four weeks before the operation.

c. Hirshberg and Katz. Two cases of advanced retinal glioma. In the first part, the choroid and optic nerve were already affected; the second was in the stage of fungous proliferation.

9. Delafield (*ibid.*, Bd. ii, 1, p. 172). An early extirpated case. The rod-layer was still quite unchanged, although the tumor filled

the entire cavity of the globe. No retinal detachment, as the tumor had developed only toward the interior; choroid and optic nerve normal. Two months later, as long as the case could be observed, no relapse.

In four other, more advanced cases, the *optic nerve* was invariably affected (*i. e.*, chiefly the nerve-fasciculi, as von Gräfe had stated before; the sheath and connective-tissue meshwork being almost unchanged). The choroid, sclerotic, and brain were likewise involved. Once, secondary tumors in temples and lower jaw. In all, lethal issue sooner or later after the operation.

10. Nagel (Jahresbericht, 1871, p. 305) "from his observations, would like to classify the gliomata again among the small-celled medullary sarcomata. In both, differences in size of the cells and the quantity of the basis substance occur in various parts of the tumor. In both forms of tumor, too, the clinical progression and the development of secondary tumors coincide." (Comp. Markschwamm, p. 133, &c.)

11. Knapp (*Arch. of Ophth. and Otol.*, vol. ii, 1, p, 158). A case in which the retina, detached in funnel-shape, was exclusively affected. Its posterior part in a state of diffusely gliomatous degeneration, with hypertrophy of the radial fibres and atrophy of the nervous elements, obviously in consequence of earlier inflammatory processes which had led to partial pigmentation of the external layers, from the pigment epithelium. The chief point of origin seemed to be the internal granular layer, rather than the external (comp. Markschwamm, p. 91, below); in part also the fibrous layer, from which proliferations extended into the vitreous. The border of both granular layers, however, was more or less ill defined, and the intergranular layer had disappeared, so that the starting point was hard to determine.

12. Nettleship (*Ophth. Hosp. Rep.*, vol. vii, p. 217) describes a case in which the enucleation was not performed until four months after the first presentation, on account of doubtful diagnosis. Although the vitreous space in this case was filled by one very large and several smaller, incompletely separated glioma nodes, still there existed no considerable retinal detachment; only at the place of the larger node was its external surface somewhat irregular. The granular layers seemed to be the starting point. The choroid showed flat, gliomatous deposits on its internal surface, and the optic nerve incipient gliomatous infiltration.

13. Geissler (*Kl. Monatsblätter f. Augenheilkde.*, p. 102) con-

tributes a case of bilateral glioma. Perception of light remained to the secondarily affected eye exceptionally long ; even when the picture of amaurotic cat's eye was present. Lethal issue from exhaustion, not from extension of the tumor into the cranial cavity. Both optic nerves were atrophic beyond the chiasma.

14. Watson, Sp. An eyeball supposed to be affected with glioma of the retina ; removed from an infant, æt. ten months. *Transact. Path. Soc.*, xxi.

15. Battmann (Diss., Leipzig, 1870), describes a case of bilateral glioma, with tumors in the region of the cheek, on the forehead, on the upper jaw, on the sella turcica, starting from the orbit and in other parts of the cranial cavity.

16. Watson (*Transact Pathol. Soc. of London*, vol. xxii, p. 218) gives a description of a case of large secondary gliomata in the neighborhood of the os zygomaticum, and on the vault of the cranium.

17. Rusconi (*Rendiconto del R. Inistituto Lumbardo*, Serie 11, vol. iv., Fasc. vi. *Rivista elínica di Bologna*, Gingno. p. 169).

A case of bilateral glioma with numerous secondary nodes of very considerable size on the cranium and in the liver, and smaller ones in the right kidney and in the ovaries. Lymphatic glands only hyperplastically enlarged. All the tumors exhibited glioma structure, with varying amounts of connective tissue. In the osseous tumors were found numerous marginal, needle-shaped projections of neoplastic osseous tissue, like those formerly described by Schiess-Gemuscus and Hoffmann. The liver metastases consisted of an accumulation of small round-cells in a net of coarse connective-tissue cords and sparse vessels. In the meshes of the latter, the cells were again embedded in a delicate reticulum of connective tissue. The larger tumors are separated from normal liver-parenchyma by a zone of metamorphosed liver-tissue. A similar structure is shown by the renal and ovarian tumors ; those of the face and the dura mater had more slender tracts of connective tissue and wider meshes, also larger vessels.

18. Arcoleo (*ibid.*, 307). A case of secondary tumors on the cranium. The tumor-formation on the basis extended to the tractus, chiasm, thalamus, and the adjoining parts of the brain. Different from the ocular tumor, however, these exhibited glio-sarcoma structure.

19. Bizzozero (*Giorn. dell' accad. di Med. de Torino*, 10 maggio, German transl. in Moleschott's Untersuchungen, vol. xi, with a

plate), in a case of glioma retinæ with formation of metastases (that of Rusconi), examined the metastases in the liver, and found, in the smallest tumor-nodules, the capillaries of the liver acini filled with numerous glioma-cells, occasionally mixed with red blood-corpuscles; while the surrounding liver-cells and the walls of the capillaries were unchanged. Within the nodules, the glioma cells often lay in the protoplasm of the liver-cells around the nucleus—sometimes one, at others several, thereby, in the latter case, greatly distending the cell. He explains the case not as one of endogenous cell-formation, but as a kind of invagination.

According to Nagel (*Jahresbericht*, 1871, p. 307), these observations lend considerable support to the theory that the formation of metastases, in the present form of tumor, is brought about by transportation of minute morbid particles through the blood-vessels.

C., 1872.

20–24. Nellessen (Inaug. Diss., Halle, 1872), describes five cases of glioma of the retina.

a. In the first case—besides the main tumor, which, in the temporal portion of the totally detached retina, merged into the latter without any clear line of demarcation lens—shaped swellings were found as the most recent stage of the tumor-formation, in the inner granular layer, while the remaining layers were preserved. Although there were cellular infiltrations into the optic nerve, no relapse occurred.

Hence this case would strikingly confirm the view that glioma commences in the internal granular layer with small circumscribed patches of accumulated round-cells (comp. Markschwamm, p. 90).

b. This case, in which the tumor, the size of a pea, started from the optic papilla without implication of the optic nerve, but of all retinal layers, offers nothing of special interest. No relapse after five months.

c. In the third case, in which a few weeks after extirpation blindness of the other eye ensued, diphtheria was the cause of death. The whole globe was filled with the morbid mass; the sclerotic was perforated in many places.

d. In this case likewise, blindness of the other eye ensued soon after extirpation. The retina was thickened throughout, except-

ing the optic nerve entrance; the choroid was merged into the mass of the tumor.

e. The fifth case is of special interest and, *might even be the only one on record, in so far as, after the operation of a relapse, the child, a girl of eight, remained alive.* The tumor filled the greater part of the vitreous space; sclerotic perforated in front; the major portion of the choroid had disappeared. After enucleation of the globe, a local relapse from the trunk of the optic nerve soon followed. Total removal of the entire contents of the orbit and scraping of the periosteum; the trunk of the optic nerve, at its entrance into the orbit, showed no cellular infiltration, but only fatty degeneration; no further relapse occurred, and the child was in perfect health four years and four months later. Basing on this result, Nellessen urgently advises, as soon as possible to remove the entire contents of the orbit, in all cases in which the neoplasm has exceeded the limits of the globe.

25. Wilkinson (*Transact. of the Pathol. Soc. of London*, vol. xiii, p. 220).

In this case, after extirpation, which was performed late, the optic nerve proved likewise affected. Soon a local relapse, implicating brain and cranium.

26. Wilson, Henry; Glioma and Sarcoma of the Eye. *Brit. Med. Journ.*, April 6th, p. 381.

Wilson further reports that all of eight children in one family were attacked with glioma. Three died of this affection; one of a tumor at the base of the brain; the others survived.

D., 1873.

27. Nettleship (Curator's Pathological Report, *Ophth. Hosp. Rep.*, vii, p. 609) reports a case of glioma in which the tumor, on the one hand, proliferated through choroid and conjunctiva; on the other, filled the entire contents of the globe. It deserves mention that the part of the optic nerve removed with the globe showed no cellular infiltration.

28. Norris (*Philadelphia Med. Times*, Feb. 8th) likewise furnishes the description of a case of retinal glioma, in which, soon after extirpation of the affected eye, a local relapse in the orbit and tumors on the head appeared. Two months after the operation, a lethal issue occurred. The autopsy showed that the external cranial tumors sprang from the periosteum, and that numer-

ous tumors spread between the bone and the dura mater, the latter tightly adhering to them. In the brain substance itself on trace of gliosis was demonstrable.

29. Wadsworth (Transact. Amer. Ophth. Soc., p. 11) communicates a case of retinal glioma, which appears to him specially noteworthy because in it the stage of atrophy was of much longer duration than in cases heretofore observed (comp. Markschwamm, p. 217). It occurred in a boy of not quite three years, who came under his treatment with symptoms of panophthalmitis of the left eye. On making a cross section through the cornea for the reduction of the tension, one could feel a dense body with the knife, and nothing flowed from the wound. This pointed to the presence of a tumor. A more careful inquiry elicited that the boy's mother had noticed a small spot in his left eye when he was six months old (the question whether this spot is to be considered as an opacity due to a corneal abscess, and in no connection with the tumor, we leave undecided). This spot persisted unchanged up to the fourteenth month of the child's age; at that time, however, a very violent inflammation, with great swelling of the eye, ensued, which soon changed into atrophy. The eye then remained without any reaction for twenty months, until, ten days before the boy came under observation, a fresh inflammation and protrusion occurred. Enucleation of the eye, together with a tumor situated at its posterior periphery. Soon after the successfully performed operation, brain symptoms and local relapses. Five weeks later the tumor, already filling the orbit, protruded; pupil of right eye dilated and immovable. S.=o. Death occurred still five weeks later, the pupil having returned, a few days before, to normal width and good reaction, although perception of light was absent.

Autopsy refused. The tumor filling the aphakial globe, and the retrobulbar tumor, proved to be gliomata, which had also attacked the optic-nerve sheath. The optic nerve fibres destroyed, in their place only their fragments and cells.

In Wadsworth's opinion the behavior of the right pupil is deserving of special mention. About three weeks after enucleation of the left eye, dilatation of the right pupil having set in, as in paralysis of the sphincter, shortly before death the pupil had regained its normal width and mobility, although amaurosis continued.

He explains the loss of vision by the extension of the affection

to the chiasm; the return of the pupillary reaction is inexplicable to him. (Comp. Nagel, *Jahresbericht*, 1873, p. 391.)

30. Goldzieker (*Arch. für Ophth.*, Bd. xix, 3, p. 119) describes a case of glioma with extension of the tumor to the subvaginal space of the optic nerve.

31. Smith, Priestly; Glioma of Eyeball and Choroidal Sarcoma. *Brit. Med. Journ.*, March 1st, p. 236.

32. Torday (*Pesther Med.-Chir. Presse*, p. 50). A case of gliosarcoma.

33. Carreras y Arago, Observ. clinecas de un glioma y un gliosarkoma de la retina. *La Cronica oftalm.*, p. 45. *El Siglo med. Agosto.*

E., 1874,

34. Landsberg (*Arch. für O.*, Bd. xxi, 2, p. 98). Two cases of typical retinal glioma; in one there was no relapse after eighteen months, although the piece of optic nerve, about 8 *mm.* in length, removed at the same time, was half infiltrated with cells. The second case ran an equally favorable course, the globe having been removed two years after the onset of the glioma.

35. Thalberg, J. (Inaug. Dissert., Dorpat, 1874. Gliom und Gliosarcom, p. 9). Two cases of glioma and one case of gliosarcoma. The one case of glioma is noteworthy, as the microscopic condition militates against the theory that retinal glioma originates in a hyperplasia of the granular layers; the latter, namely, had perished by atrophy, although some retinal tissue had been preserved toward the ora serrata. There were, besides, pretty extensive heteroplastic patches in the choroid, optic nerve, and sclerotic. Nowhere, though, was there any free communication between the intra- and extra-bulbar tumors. Altogether, the extension of glioma from the retina does not take place through proliferation of the glioma cells into the remaining parts of the eye, but through participation of the cellular elements they contain. In the choroid the stroma is first attacked and infiltrated with cells, so that between it and the gliomatously degenerated retina nothing remains but choriocapillaris, vitreous, and pigment epithelium; should these layers likewise be involved in the tumor-formation, then the affection takes place, not from the side of the retina, but from the choroid, and it is the choroidal glioma which finally perforates the lamina elastica. In the same way it is the cells of the pigment epithelium which participate in

the formation of glioma cells, by decoloration and nuclear division; and they do so independently, incited by the apposition of old glioma-cells of the retina, as in proportion to the proximity of the optic-nerve entrance, from which the glioma of the retina develops, the cell-proliferation from the nuclei of the pigment epithelium is more considerable and advanced. As the vascular layer of the choroid is first attacked by the new-formation, and as in it the oldest places are found in the neighborhood of the optic nerve entrance, it is most probable that the infection takes place from the retina through the blood-vessels to the choroid, the more so as the retinal and ciliary vascular systems communicate at the optic nerve entrance, It is probably for this reason that the sclerotic, which is involved last of all, first becomes diseased at the optic nerve, and then at the ciliary margin. But here, too, the cellular elements proliferate, and no glioma-cells grow into it.

According to Thalberg, the optic nerve is very soon attacked by the gliosis, and if it was found unaffected in retinal glioma, it is possible that some still normal place came under observation, as retinal glioma spreads in patches and not continuously (Alf. Graefe).

36. Knapp and Turnbull (ARCH. OF OPHTH. AND OTOL., vol. iv, p. 1) report on a case of retinal glioma of the right eye, with perforation into the orbit, and a tumor in the right temporal fossa. After enucleation of the globe, relapses in the orbit; further tumors developed at the vault of the cranium, and five others on various parts of the head. The left globe protruded, tetanic convulsions ensued, after which, strange to say, all tumors shrank, excepting the one in the orbit. An additional swelling having developed at the palate, the child died of exhaustion. The metastatic tumors at the cranium are between bone and periosteum. All the secondary tumors exhibit glioma structure; the subperiosteal ones are gliomata with formation of oteophytes. The right optic nerve, as far as the chiasm, is of double the size of the left; the chiasm itself is soft. No pathological alterations in the left eye.

37. Thomson and Knapp (*ibid.*, 79). This case is interesting mainly on account of five members of the same family having been affected in the same way (the four relatives also died). In the one-year-old child no relapse had occurred six months after the early-performed operation. The glioma had sprung from the

inner granular layer; limitans interna not yet perforated. Optic nerve and choroid still intact.

38. Hirschberg (*Klin. Beob.*, p. 9, and *Beitr.*, ii, p. 34) reports a case of retinal glioma in which he performed the enucleation of the morbid globe on a child of two months and a half. The mother claims to have noticed an alteration of the eye in question immediately after birth, Noteworthy for a case of congenital glioma is the fact that no relapse or metastasis had occurred three years and a half later. In other respects too this case is of interest. In the eye, hitherto free from irritation, violent inflammatory symptoms, presenting the picture of acute glaucoma, were observed after atropine instillations, and four days later, in consequence of the acute inflammation, the tumor had attained double its previous size.

The case of retinal glioma mentioned by Lindner (*Allg. Wiener Med. Zeitung*, Nos. 12, 14, 19) happened in a man of 45, from the posterior pole of whose sclerotic a cauliflower-like excrescence proliferated. Vitreous completely, and choroid and retina partially merged into the neoplasm. A strong magnifying glass is said to have demonstrated the typical structure of retinal glioma. But inasmuch as microscopical examination is lacking, this case can find no place in the literature of retinal glioma, this neoplasm not being diagnosticable without the microscope, and, moreover, not hitherto found in an adult (comp. Markschwamm, pp. 164, 165).

39. Steffan (*Jahresbericht* 3, p. 30). A case of glioma retinæ in which the retina was almost completely replaced by the neoplasm. Optic nerve still intact. No relapse a year and four months later.

40. The appearance of a retinal tumor, described by Helfreich (*Arch. für Opth.*, Bd. xxi, 2, p. 236), occurring in a girl of 18 months, in whom the optic thalami were imperfectly developed, with absence of the second pair of nerves, and of the retinæ in both diminutive eyes, does not correspond to a pure glioma, but rather a gliosarcoma.

41–42. Knapp and E. Williams, ARCH. OF OPHTH. AND OTOL., vol. iv, p. 241). Two cases of retinal glioma.

a. The first case happened in a girl of twelve, hence in a rather advanced age. The location of the pseudoplasm was the anterior and especially the ciliary part of the retina; it was strongly pigmented, but limited to the retina. Six months after the operation no relapse.

b. The second case occurred in a boy aged 4½ years, in whom the tumor had already perforated the globe and attacked the optic nerve. Soon after the enucleation a new tumor developed in the orbit, another one in the abdominal cavity; the other eye grew blind, and the boy died.

43. Brière (*Gaz. des Hôp.*, No. 114, p. 907) enucleated one eye in a child, æt. 28 months, affected with amaurotic cat's-eye. A month previously, when the enucleation had been refused, he had diagnosticated a tumor, about the size of a hazel-nut, which completely covered the papilla, and on the surface of which some new-formed vessels extended besides the retinal ones (as in our case). The microscope demonstrated a pure retinal glioma. The tumor appeared to have been an excresence of the optic nerve; no relapse seven months after the enucleation.

44. Gayet, A., et F. Poncet, Gliome de la rétine. 2 pl. *Arch. de physiol. norm. et path.*, p. 304. This case offers no peculiar features.

45. Brailay (*Ophth. Hosp. Rep.*, vol. viii, 2, pp. 297, 308, 311) describes three cases of glioma of the retina.

46. Dreschfeld's (*Centralbl. f. d. med. Wissensch.*, p. 196) case of retinal glioma in a two-year-old child shows the rather rare phase of *non*-detachment of the retina. A tumor about the size of a hazel-nut is attached to the inner surface of the retina near the ciliary margin; numerous other smaller tumors are also present.

Dreschfeld thinks himself justified in drawing therefrom two deductions: 1st, that the theory locating the origin of glioma in the inner granular layer is correct (comp. Markschwamm, pp. 90, 95, et seq.; Knapp, ARCH., vol. iv, p. 241); and 2d, that the transportation of the glioma-cells takes place by way of the perivascular lymph-channels which are present in considerable number in all retinal layers, and probably communicate with the masses of glioma-cells (comp. also case 30).

47. Mazza (*Revista clin. de Bologna*, p. 209).

In this case of retinal glioma in a child, æt. 13 months, the entire globe was filled with a gliomatous mass, and the retina no longer demonstrable. Five months after the enucleation, the child was still perfectly healthy. Opposed to the opinion of nearly all authors, Mazza denies the possibility of a retinal detachment in the first stage of glioma. The retina, he maintains, perishes in the pseudoplasm which, without detaching itself from the choroid, steadily advances into the vitreous. (To this view Brettauer ob-

jects the question, "How about the non-infiltrated parts of the retina?" Comp. Nagel, *Jahresbericht*, 1875, Bd. vi, p. 390).

48. Albini, G. (Distruzione d'un glioma retinæ mediante l'acido cromico in soluzione. *Il Morgagni*, Maggio, p. 361).

In opposition to the radical cure of glioma of the retina attempted by all authors of the present time by means of enucleation of the affected eye, Albini endeavored, in a case of glioma retinæ in an eight-year-old girl—fearful lest the enucleation produce diminution of the orbital cavity, and disfigurement of the corresponding half of the face in the future development—to destroy the tumor by injection of a two per cent. solution of chromic acid. Having first formed a corneal flap, he evacuated the lens, and in six days injected three times a Pravaz syringeful of the solution into the parenchyma of the tumor which filled the entire vitreous space. The reaction was trifling, the pains formerly existing grew less, and the globe, which had commenced to soften, began to shrink. The case could not be observed any further, as patient withdrew from treatment after eighteen days.

Linde (Hospitalstidende R. 2, Bd. ii, p. 97). Case of glioma in the eye of a child.

49. Agnew, C. R., and Eno, H. C. (Transact. Amer. Ophth. Soc., p. 349). Case of bilateral glioma. In a boy, aged seven months, a yellow reflex was first observed in the left eye, and the globe enucleated six months later. Six months after, the same appearance in the right eye, soon followed by its enucleation. No relapse after one year. The tumor of the left eye was examined by Eno. Connected with the optic nerve, it filled the most posterior part of the globe. In the centre of the pseudoplasm some remnants of the entirely detached retina are still recognizable. The retina is best preserved in its most anterior parts, and in some places it may be seen that the tumor sprang from the external granular layer. The removed optic nerve shows cellular infiltration.

50. Zinke, Glioma of both eyes. *The Clinic*, Aug. 8th.

F. 1876.

51. Nettleship (*Ophth. Hosp. Rep.*, vol. ix, p. 40). Four cases of retinal glioma. In two cases the operation was effective; in both, the disease was in the first stage and confined to the eye. In the other two cases with extraocular extension, local relapse quickly followed.

52. Warlomont et Duwez, Du gliome de la rétine. *Ann. d'Ocul.*, tome 16, p. 5.

53. Baumgarten (*Arch. für Ophth.*, Bd. iii, p. 185). A case of glioma of retina and optic nerve, in a boy æt. 5, in whom the parents had observed the phenomena of amaurotic cat's-eye three years before, which had disappeared only two months ago. The optic nerve was enormously thickened. The retina, detached in funnel-shape, incloses a nodule, about the size of a millet-seed, in the neighborhood of the optic-nerve entrance; a second one, somewhat larger, in its anterior section; they proved to be composed, in their centre, of non-vascular detritus and cells. The places not nodularly thickened showed a broad layer of glioma-tissue, the stump of the optic-nerve was likewise in a state of total gliomatous degeneration. This case deserves special men tion because, after an existence of at least three years, the gliosis had confined itself only to the retina and optic-nerve; the other ocular tissues, such as choroid, sclerotic, cornea, proved quite normal. It confirms, therefore, the statement that glioma sooner extends to the optic-nerve than to the choroid (comp. Markschwamm, p. 101, and Thalberg, case 30).

54. Hale, T., Glioma of retina. *The Philadelphia Med. and Surg. Rep.*, p. 63.

55. Lawson, *Lancet*, i, p. 163. Lawson never saw a glioma in children of over five years; the youngest was six weeks old; hence the glioma probably congenital. He only knows two exceptions to the rule, that both eyes are successively attacked by glioma. One of the children was two years and eight months old; enucleation in 1872. The other child, one of Hulke's patients, showed no relapse eight years after the operation. Lawson enucleates both eyes, one after the other, if both are affected, and every prospect of cure has vanished, in order to mitigate the terrible sufferings of the little patients.

56. Brailey, W. A. (*Ophth. Hosp. Rep.*, vol. viii., p. 65). Five microscopical examinations of retinal glioma with the ordinary appearances.

G., 1877.

57. Walzberg's gliosarcoma retinæ of traumatic origin (Zehender's *Monatsbl.*, 1877, p. 172) is declared a product of inflammation (hyalitis suppuration) by Hirschberg (comp. *Centralblatt*, Aug., 1877, p. 166), and does not belong in our category

58. Steinheim, Traumatic retinal glioma and sympathetic irido-choroiditis (Hirschberg's *Centralblatt für Augenhlkde*, 1877, p. 172).

This case appears to be the only one, so far, in which the tumor was caused by a preceding trauma. In a girl of ten, who, according to the anamnesis, had never before suffered from any eye-affection, immediately after a book had been thrown on one of her eyes, there occurred inflammation and pain in the injured eye; vision is said to have been intact formerly, and to have changed after the throwing of the book. The pain and irritation increased, until they finally became intolerable, so that the child emaciated greatly. When coming under observation, the right eye presented the following picture: Lids much swollen; globe very painful to the slightest touch. Conjunctiva likewise markedly chemotic. Near the internal rectus a small spot simulating an abscess, where from a conjunctival opening a trifling, friable mass, resembling pus, is exuding. Probing fails to demonstrate any connection with an intraocular tumor. Cornea lustreless, opaque; anterior chamber obliterated; iris of a dirty color, its surface strongly vascularized; pupil blocked by a yellowish-white mass. The seemingly enlarged globe has a doughy feel, especially on its inner half, and gives to the palpating finger the impression of an intraocular tumor; while mere inspection would favor the diagnosis of suppurative choroiditis.

In the left eye, sympathetic irido-choroiditis which, in spite of immediate enucleation of the right globe, ended a few months later in atrophy.

The enucleated globe, cut in its horizontal diameter, is filled with a whitish mass in which vessels are no longer recognizable. The microscopic examination (by Prof. Becker) demonstrated a "gliomatous new-formation" which had proliferated so much that its place of origin could no longer be discovered; even the different membranes are hard to distinguish. The entire contents of the globe—lens, ciliary body, iris—have disappeared; the latter is only indicated by a stronger pigmentation in the pseudoplasm. Choroid and retina likewise remain unrecognizable. In their places is a friable mass, partially crumbled into a greasy-looking detritus, in which the microscope demonstrates, in thin sections an amorphous, homogeneous intercalary substance, interspersed with numerous nuclei, as in retinal glioma. In some nests a regressive metamorphosis of the elements of the tumor is shown.

The relative scarcity of vessels explains the whitish appearance of the swelling on section.

Steinheim then calls attention to the rare occurrence of an intraocular tumor causing a sympathetic affection of the other eye. As proof he considers the fact that this cause is not mentioned, either in Mooren's "Sympathische Störungen" or in Hirschberg's "Markschwamm." Moreover, in the literature accessible to him —not counting the sympathetic ophthalmia after operation of an iris-tumor, related in Mooren's "Ophthalm. Beob.," p. 127—he found only one communication by Hirschberg (Arch. für Ophth., Bd. xxii., 4, p. 146) which proves the occurrence of sympathetic ophthalmia, during intraocular tumors of the other eye, beyond doubt.

No relapse had occurred in the girl nine months later; but she died, one year after the operation, from some chronic affection; no physician had been consulted.

H., 1878.

59. Pufahl, Dr. M. (Hirschberg's Beiträge zur pract. Augenh., Bd. iii., p. 70) gives the description of a retinal glioma in its second stage, in a six-year-old girl. After the enucleation, not only the piece of optic nerve removed, but also the portion remaining at the optic foramen, proved affected with the tumor formation. Death occurred three months later. Autopsy refused. On section, the preparation offered an exquisite picture of retinal glioma extending to uvea and optic nerve; it was sent for further examination to Dr. Goldzicher, of Budapest.

60. Santarnechi, Dr. Virginio (*Ann. di Ott.*, 1878, Fasc. 1, p. 19) likewise describes a case of retinal glioma in a child of five years, with accurate microscopical appearances. The optic nerve does not seem to have been examined. No new views are deduced. No relapse after eight months.

A case of gliosarcoma might likewise here find mention, for the sake of completeness (*Centralblatt für Augenh.*, p. 64).

If we examine, in conclusion, the preceding collected observations of the most different authors within the last ten years, in accordance with the three points of view mentioned at the beginning, we obtain the result that in the main they contain a confirmation of what Hirschberg, as early as 1869, in his "Markschwamm der Netzhaut," presented as the

sum of the knowledge gained till then. Of paramount interest appear, aside from the more accurate investigation into the formation of metastases: 1st, the traumatic origin (Steinheim, case 58); and, 2d, the curability of a local relapse by exenteratio orbitæ (case 24, A. Gräfe), which, by the way, could also be demonstrated recently (*Annal. d'Oculist.*, 1879, fasc. for Jan.-Feb.), in a case of Brière's, at Havre (comp. Markschwamm, p. 251).

A CASE OF POISONING FROM THE USE OF THE COMPOUND TINCTURE OF CINCHONA, PRODUCING PERMANENT CONTRACTION OF THE VISUAL FIELDS AND TEMPORARY IMPAIRMENT OF SIGHT AND HEARING.

By D. B. St. JOHN ROOSA, M. D.

ON the 3d July, 1878, Dr. L. M. Yale asked me to see a case of loss of sight, of which the following history was obtained: Mr. B., æt. 50, a man of very intemperate habits as regards the use of alcohol. He had been accustomed for years to drink enormously of brandy and whiskey at intervals, but there were periods of varying length, from one to three or four months, of total abstinence from intoxicating drinks.

Mr. B was told that the use of the tincture of cinchona would relieve him from his periodic craving for alcohol. On June 24th of this year he began its use, with a view of correcting his intemperate habits. On that day, as well as on the 25th 26th, 27th and 28th he continued to take the compound tincture in ounce and two ounce doses, at short intervals, literally drinking it as a beverage from a quart bottle, in which he had caused an apothecary to place as strong a preparation as possible. On the 28th, although he had taken none of his ordinary alcoholic stimulants, his clerk thought from his conduct that Mr. B. had been drinking heavily. Dr. Yale estimates that in these days the patient took an amount of the tincture which would be equivalent to 125 grains of an alkaloid of cinchona. Mr. B. has no recollection of any occurrence after the 27th. He is confident that he took no alcohol, except that contained in the preparation of cinchona during these days. This, however, may be doubtful, for the clerk of the hotel to which he went when in what proved to be a semi-conscious state on the 28th, states, that while he lay in bed he was constantly ringing the bell for liquor. It is possible that during this time some doses of alcohol were added to those of

cinchona, although Mr. B. does not believe this to be the case. On the morning of July 1st he was seen by Dr. Hills in the absence of Dr. Yale. He found the patient stupid or half conscious, with flushed face and conjunctivæ, and apparently unable to see or hear. Mr. B. remembers Dr. Hills visit on Sunday, and knows that he was then blind and deaf. Dr. Yale saw the patient on Monday and Tuesday, July 2d and 3d. His hearing power improved so much in that time as to become apparently normal, but his vision remained very much impaired. On the day I saw Mr. B., the 3d, he was groping about his room, apparently in excellent general health. V. *R. E.*=quantitative perception of light. *L. E.* counts fingers at one foot. The ophthalmoscope showed lessened size of the arterial vessels; no abnormity in the veins, lessened number of vessels on the papillæ, but no marked paleness. No changes observed in the membrana tympani. The patient was advised to take strychina in increasing doses and nutritious diet. On July 6th he was able to walk about. V.=$\frac{20}{30}$ each eye, but the visual fields were very much contracted, so that vision was telescopic.

On July 16, 1878, both visual fields were found concentrically limited. The measurements, drawn on a blackboard 14″ distant, were as follows: Right field, vertical 9 inches; horizontal 7½ inches; limitation most marked in temporal side. Left field, vertical, 7 inches; horizontal, 8 inches; limitation more regular. B. found this symptom rather novel than troublesome. The optic papillæ looked very pale, and the arteries were narrow. July 23d, V.=$\frac{20}{30}$, each eye. Patient states that he can see perfectly well in a straight line, but that when walking about a room he has some difficulty in seeing small articles of furniture.

Sept. 10*th.*—The same condition is maintained. The strychnia was taken until $\frac{1}{10}$ grain had been reached at a dose, and was continued for two months. The visual field remains as on July 16th.

April 23, 1879.—Mr. B.'s condition remains substantially the same. He continues to abstain entirely from the use of alcohol, and carries on a large business successfully. His vision is still $\frac{20}{30}$ each eye. The visual field has increased somewhat in the left eye. It now measures 9 inches vertically and 16 inches horizontally. F. of *R. E.* 6″ vertically, 9″ horizontally. Limitation most marked at upper-inner quadrant. The optic disks are pale and the arteries small. There are no other ophthalmoscopic appearances.

Remarks.—Mr. B. had taken no alcohol for some months prior to his beginning the use of the cinchona, and he took none until he became unconscious on the fourth or fifth day. Although he went about and transacted business on the fourth day, he has no recollection of what he did. When found he had an empty bottle (holding a quart) in his room, labelled and giving positive evidence of having contained cinchona. He certainly did not take many drinks, if any, after he reached the hotel, for the clerk, knowing his former habits and supposing him to be suffering from an ordinary debauch, refused to answer his demands. It is *not known* that he took anything but the cinchona at any time after he began the treatment of the alcohol habit.

We have here, then, a case of hyperæmia of the vessels of the ear from the use of cinchona and alcohol—a hyperæmia which passed away without going on to an exudative process; but the same condition in the vessels supplying the retina continued until a true vasculitis, with its consequences, resulted.

The future condition of this patient, even if he never assumes the alcohol habit, cannot be regarded without anxiety. It is to be feared that in time the macula may be insufficiently nourished from further contraction of the vessels. The peripheric parts of the retina have now very little, if any perceptive power, the nerve is perhaps undergoing atrophy. It is, I think, undoubted from many experiments among which are my own,* that cinchona causes at least temporary hyperæmia of the vessels of the base of the brain. I am fully aware, however, that, although certainly there was absolutely no loss of sight until the poisoning by cinchona occurred, there may have been changes in his circulation induced by alcohol, prior to this attack, and I also do not forget that there was enough alcohol in the preparation which he took, to prevent the case from being a typical one of cinchona poisoning, yet the quantity must have been too small to have added much to the effect of the other drug. He may, however, have

* Treatise on Diseases of the Ear 4th edition, page 516.

drank considerable brandy on the day of which he has no recollection, and some also after reaching the hotel. Certain it is however, that he reached the unconscious state upon doses of the tincture of cinchona alone. Imperfect as is the case in some respects, it may, I think, be regarded as a contribution to our knowledge of the effects of cinchona upon the nutrition of the eye.

A CASE OF SUCCESSFUL EXTRACTION OF A PIECE OF A GUN-CAP FROM THE POSTERIOR CHAMBER OF THE EYE.

By Prof. EDWARD VON JAEGER, of Vienna.

Translated by Dr. H. Knapp.

COUNT L. T., about 40 years old, had the misfortune to injure his right eye while discharging a hunting-piece. A small fragment of a copper gun-cap penetrated through the outer lower marginal part of the cornea into the eye in a direction upward and inward, and remained lodged in the inner-upper segment of the sphincter muscle of the iris.

This splinter of metal had, as was subsequently demonstrated, an oblong triangular form, its basis being 1 *mm.* in length and ½ *mm.* in breadth. Its point had obliquely pierced the whole thickness of the iris, touching the capsule of the lens without wounding it. It pressed in such a way against the capsule that by intense illumination neither a contraction of the corresponding meridian of the pupil nor a locomotion of the foreign body was noticeable. Instillation of atropine, however, produced a uniform dilatation of the pupil and corresponding displacement of the chip of metal. The broad end of the foreign body projected over the anterior surface of the iris, and during the first days after the injury, while the cornea and aqueous humor were perfectly clear, it could not only be distinctly seen, but in favorable light easily recognized by its yellowish red metallic lustre at a distance of several feet. In spite of antiphlogistic treatment, severe inflammatory symptoms ensued in the anterior segment of the globe, and the foreign body was

surrounded and more and more hidden by a patch of pus. The development of ophthalmitis being imminent, the removal of the chip of metal by an operation was attempted. My father, Prof. Friedrich von Jäger, thrust a curved lance-shaped knife through the inner segment of the cornea near its scleral margin about 6 *mm.* in extent. Through this wound a pair of slightly curved iris-forceps was introduced, with its convexity backward, and with open branches moved forward between iris and cornea as far as the pupillary edge in such a way that the patch of pus enclosing the foreign body lay between the branches of the forceps, which then were closed. The corresponding portion of the iris, grasped with the forceps, was drawn out and cut with scissors close to the edge of the corneal wound.

When the exsected piece of iris was spread out, great disappointment was caused by the failure of finding the foreign body which, it was evident, had been left in the interior of the eye. By careful and repeated examination of the eye, which could be done with a high degree of accuracy, since no hemorrhage into the anterior chamber had occurred and the pus was perfectly evacuated, the chip of metal could not be found either in the corneal wound or in the dilated pupil, nor in any place between iris and cornea.

During the operative procedure, while uninterruptedly watching the patch of pus which enclosed the foreign body, I had received the impression, as though in the moment the forceps were closed, a faint yellow point of light, starting from the patch of pus, darted across the pupil in a direction outward and somewhat downward. As the chip could not be found, I was of the opinion that the appearance of the point of light could have been caused by the foreign body only, which, suddenly escaping the grasp of the forceps, had flown through the pupil and, between iris and lens, into the posterior chamber of the outer hemisphere of the eyeball. For the purpose of finding and removing the fragment of metal from its supposed new location, I chose a slightly curved pair of forceps, the branches of which were somewhat broader than those of ordinary iris-forceps, and hollow in their inner surface. The globe fortunately being

perfectly relaxed and kept unusually steady, I was able to introduce the closed branches of these forceps, the convexity looking backward, through the corneal wound across the pupil as far as its opposite edge. There I moderately opened the branches, moved them forward in the direction of the point of light noticed before, about three-fourths of the breadth of the iris, closed them at once, and withdrew the instrument from the eye.

In doing this I had neither seized the foreign body nor obtained any clue as to its hiding-place. I, therefore, introduced the forceps again in the same manner and direction as before, advancing them, however, this time so deeply between iris and capsule, that I distinctly felt their points pressing against the ciliary processes and the ciliary muscle. Now in closing the forceps, I at once clasped with their branches a hard foreign body which I successfully drew out of the eye. Subsequent examination showed that in reality the foreign body was the chip of metal which had entered the eye through the cornea and had lodged in the iris. It was a fragment of a copper gun-cap in shape and size as described above. Under strict rest and antiphlogistic after-treatment, the pre-existing nflammatory symptoms disappeared within a few days, and the wound of the operation healed by first union.

When, a week after the operation, the eye was examined more carefully by daylight, we encountered a new surprise: —the coloboma resulting from the excision of the iris had disappeared. The cornea was normal in curvature and transparency, the corneal wound had firmly healed without notable opacity or swelling, the anterior chamber was of normal depth, the pupil correctly in its central position, almost of the same width as that in the other eye, and perfectly round in shape. The edges of the wound in the iris were united with each other and to the anterior capsule in such a way that the iris, when seen by ordinary daylight, appeared in this place of the same width as in its other portions, and the cicatrix of the iris, running from the pupillary edge meridionally toward the periphery of the chamber, presented a delicate, somewhat darker line. Fur-

ther examinations and experiments made during the following days demonstrated that the pupil promptly responded to changes of illumination in its whole extent, excepting the place of the cicatrix and adhesion of the iris, and was fully dilated by mydriatics. The iris, therefore, had lost its mobility only where it was adherent to the capsule. In this condition the eye remained for a long time with unimpaired visual powers until the Count met with a new unfortunate accident. In a game at cross-bows, a hard ball struck the upper orbital margin of the formerly injured eye with such vehemence that he fell down and remained unconscious for some time. When I examined him half an hour later, I discovered no other change in his eye than a laceration of the iris at the place of its abnormal adherence. The edges of the wound in the iris from the former operation were completely detached from the cicatricial tissue which had united them to each other and to the capsule of the lens. Separated from each other they now had dilated into a broad coloboma which had communicated with the natural pupil.*

Vienna, January 28, 1879.

* While in Vienna last year, the American editor of this journal heard through Prof. Mauthner of the above related case the particulars of which, as well as the operative procedure, are most remarkable and unprecedented. At his request, the eminent author kindly sent him the above history for publication, stating in his letter that he had never published the case and that before writing this communication he had examined the patient again and found his eye still in the same condition in which it was after the recovery from the last accident, *i. e.*, twenty-three years ago. This case is not only one of the most fortunate, but also one of the most suggestive examples of extraction of foreign bodies from the interior of the eye. K.

ON THE SO-CALLED PTOSIS ATONICA; ITS NATURE AND TREATMENT.

By F. C. HOTZ, M. D.

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IN June of last year, while I was visiting my friend, Dr. J. C. Denise, in Omaha, Neb., he showed me a very marked case of atonic ptosis. The patient was a married lady of thirty-five years; but owing to the peculiar appearance of her upper eyelids she seemed to be a woman of at least 50. The skin of the upper lids was exceedingly thin and flaccid, and could be taken up in folds of an unusual size. When the lids were closed, their skin was wrinkled transversely, like in aged people; and when the eyes were open, a large fold of integument hung down over the free edge of the lids, by its weight crowding the eyelashes from the horizontal into a downward direction. In the right lid the edge of the fold reached to the ends of the very long eyelashes, and narrowed the palpebral aperture in the perpendicular direction so much that the whole pupil was hidden by it. If the patient wished to see with this eye she had to draw up the fold with her finger in order to uncover the pupil. In the left eye the skin had not fallen so much; therefore the aperture of the lids was a little larger, the pupil was not covered by the fold as long as the eye kept the horizontal position, but it disappeared behind the overhanging skin when the eye was turned upward.

The eyes showed no other anomaly; the conjunctiva was not inflamed; fundus was normal; media, clear; vision and accommodation, perfect; refraction, emmetropic.

In regard to the development of this trouble the lady informed me that she had large eyes like her daughter, pointing at a pretty

girl whose large bright eyes were shaded by lids of exquisitely regular delineation. Eight years ago she had puerperal fever, and no sooner had she recovered from that grave malady than her child was taken away, over whose loss she wept many days and nights. Her eyes were irritated; the lids became greatly swollen, and this swelling persisted during many months. When it disappeared at last, the integument of the lids began to drop down over the free edge. She noticed it first by the changed appearance of the right eye. She thought the drooping of the right upper eyelid had remained stationary for some time, while that of the left upper lid was still increasing. She had also noticed that after mental excitement, or after using the eyes much at close work, the lids seemed to droop more, and sometimes appeared slightly œdematous.

On the 22d of June I performed upon the right upper lid the operation for this kind of ptosis, recommended and practiced by all writers; I excised a transverse fold of the integument of the lid and united the edges of the wound by fine silk sutures. The wound healed very quickly; on the second day already all the sutures could be removed. During the operation I noticed that the integument was unusually thin and movable, and I could convince myself of the absence of all adipose tissue upon the lid.

The affection here described has received different names by different authors. *Sichel** called it *ptosis atonique*, of which he gave a description that seems to fit our case very well: "The skin of the upper eyelid is flaccid, wrinkled and ruffled transversely; sometimes it forms a large horizontal fold which hangs down over the ciliary border."

Mackenzie† speaks of a *ptosis from hypertrophy* in the following terms: "After inflammation of the upper eyelid, attended with considerable œdematous or sanguineous effusion into its substance, or treated by the long-continued use of cataplasms, we find the lid so much thickened, and its integuments so much relaxed, that they form a fold hanging down over the opening of the lids, while the levator palpebr. sup. is unable, from the weight and bulk of the lid, to raise it so as to uncover the eye. If we take

* Annales d'Oculist. t. xii, p. 188.

† A practical treatise on the diseases of the eye; 4th ed., p. 187.

hold, between the finger and thumb, of a transverse fold of the skin, so as to relieve the levator muscle, the patient can, without difficulty, open his eye, showing that the case is not one of paralytic ptosis. It is also occasionally the case, that when the fold of integument is very considerable, it presses, by its weight, the edge of the lid, along with the cilia, inwards so as to produce a degree of entropium. * * For the cure of this variety of ptosis, the common practice is to remove a transverse fold of the integument."

*Arlt** describes a similar affection, under the name of *ptosis adiposa:* "Sometimes we meet young people the integument of whose upper eyelids is enlarged so much that it hangs down upon the eyelashes. As to its (gradual) development, I could learn nothing definite about it. If we take up and remove a fold of this thin and normal skin, we find, directly under it, a soft, yellow, elastic fat which does not differ from the adipose tissue of the orbit, and protrudes to such an extent that a good portion of it must be removed with scissors if we wish to close the cutaneous edges of the wound. The fold of integument need not exceed 10 *mm.* in width, but it must extend from the external margin of the orbit to the region above the tear-point, in order to remove all disfiguration."

If I had to choose any of the above names for the case under discussion, I should adopt the term, "ptosis atonica," for there was, unquestionably, a certain atony or relaxation of the integument, while there was no evidence whatever of a hypertrophy of the cutaneous tissue, or of a protrusion of the adipose tissue of the orbit. But the term "ptosis atonica" does not seem to me a very felicitous expression, because, since we designate by ptosis paralytica the ptosis caused by paralysis of the levator muscle, the words "ptosis atonica" might convey the idea to our mind that this ptosis is due to atony of the levator muscle rather than of the skin. And besides, a simple atony of the integument does not fully account for the symptoms in our case. We often observe this simple relaxation of the palpebral integument in aged people. When their eyes are shut, the skin

* In Graefe and Saemisch, Handbuch der ges. Augenheilkunde, Bd. iii, p. 454.

of the upper lids is wrinkled transversely; and when their eyes are open, we often see a fold of skin hang down over the free edge of the upper lid. But by a close examination, we can convince ourselves that this fold is not formed by the integument belonging to the surface of the lid (*tarsal skin*) but is derived from the flaccid skin lying above the lid, between it and the eyebrows (*supra-tarsal skin*). This is shown by the fact that upon lifting up this fold of supra-tarsal skin upon a probe, we perceive underneath it the tarsal skin slightly wrinkled, but still so firmly adherent to the subjacent tissues that it does not overlap the ciliary edge.

I shall presently show how different the relations were in our case of "ptosis atonica."

Fortunately the patient had allowed her right eye only to be operated upon in June. I dare say "fortunately" because she afforded me an opportunity, several months afterwards, to make another careful examination of the left eye; to devise for it a different plan from the common operation in such cases; and also to convince myself of the very imperfect success of the operation upon the right eye.

Mrs. L. came to Chicago in September. Her left eye presented the same appearance as in June. The opening of the lids of the right eye was larger, and the patient was well pleased with the result. But there was something unnatural in the appearance of the right upper lid that made me feel dissatisfied with the cosmetic result of my operation. I know the lady was pleased with it only because the left eye was so much worse; but I was sure if the left eye had been in normal conditions she would have never praised me for the improvement of her right eye. For the skin of the upper lid still hung down over its free edge when the eye was open; the excision of skin, which, by the way, was done as extensively as practicable, had reduced the deformity, but it had not removed it. Watching attentively the movements of the left upper eyelid, I made the following observation: When the patient opened the eye slowly, the upper lid was well drawn back over the surface of the globe; there was no insufficiency in the action of the levator palpebr. superioris. But the integument, instead of following the upward movement of the tarsal cartilage, remained stationary as if

their surfaces were entirely disconnected. Only at the ciliary border, where the skin joins the conjunctiva, and both are firmly attached to the tarsal cartilage—there only the upward movement of the tarsus was imparted to the skin. The skin fastened to the edge of the lid was dragged upward by the latter, and the result was that the skin was rolled up upon itself into a fold (*c f d*) which hung down over the border of the lid and whose lowest line (*f*) was made up by that part of skin which under normal conditions would be opposite the upper margin (at *b*) of the tarsus (*t*) and with this ought to be drawn upward and backward into the orbit, when the eye is opened.

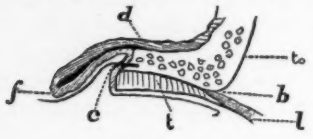

FIG. I.

It is evident that the described condition is different from the effect produced by simple relaxation of the skin. In the latter case, as we have seen, the duplicature of skin is formed by the supra-tarsal integument, and coming down over the lid conceals the tarsal skin to a greater or less degree. But here the duplicature (*c f d*) is made up by the palpebral skin itself; if we lift it up upon a probe we find its basis in a line with the ciliary border (*c*), showing that the fold has not come down from above the lid. The condition is certainly not due to protrusion of the orbital cellular tissue, nor caused by hypertrophy; for the operation upon the right eye had demonstrated the absence of fatty tissue and an unusual thinness of the integument.

The affection might best be compared with the prolapsus ani and be called "*prolapse of the palpebral skin.*" Just as in the case of prolapsus ani the mucous membrane has lost its natural connections with the other tunics of the rectum, so can the prolapse of the integument of the lid be explained by abnormal relaxation or entire destruction of the connective tissue fibres which bind the skin to the other structures of the lid. These connecting fibres composed of loose cellular tissues are naturally very weak; and we can easily understand that they might be abnormally stretched or even partially destroyed by a great and lasting œdematous swelling of the lids as it had existed in our case. As soon as the connection between skin and tarsus is dissolved, the catilage

with the muscular layer can slide upwards or downwards under the skin while the latter remains comparatively motionless; when the lid is raised, the skin is simply rolled up into a fold, and when the lid is shut, this fold is smoothed again by the downward motion of the ciliary border. This view that the ptosis atonica is a prolapse of the skin of the eyelid, is further supported by the following experiment which I have made in this case: The eye being closed and the integument of the upper lid smooth, I put a probe upon the left upper lid along a line corresponding to the upper margin of the tarsal cartilage. By a gentle pressure with the probe the palpebral skin was held down upon the cartiage in such manner that it had to follow the upward movement of the tarsus when the patient now opened her eye. There was then no prolapse of the skin, no fold hanging down over the edge of the lid and obstructing the sight. On the contrary, the eye presented a perfectly natural appearance with a large free aperture of the lids. The prolapsus could also be reduced and the normal appearance of the eyelid restored by putting the probe along the edge (*f*) of the fold and pushing this point up toward the upper border of the tarsus (say toward *b*) where it naturally belonged.

Being thus convinced that the so-called ptosis was not caused by a redundancy of tissue, but was due to a normal relaxation of the subcutaneous connective fibres, I could easily understand why the excision of a transverse fold of integument, as practised upon the right upper lid, could only lessen, but not remove the disfiguration. The skin was made shorter and therefore could not form so large a fold any more, but it did not recover a better connection with the tarsal cartilage than it had before the operation, and therefore it would still fall down as far as its reduced width allowed it. In order to obtain a cosmetic result which would satisfy our demands, we had to devise an operation by which the prolapsed skin was reposited and fastened in its normal place so that it could not drop down again. This aim could be obtained by creating a firm union between the skin and the upper border of the tarsal cartilage. If at that

point skin and tarsus are united they must move together, and in all movements and positions of the lid the skin will be extended smoothly all over its surface. The desired union between skin and cartilage was accomplished by an operation like the one described by me in the previous number of these ARCHIVES. And I take this opportunity to say that Fig. 1 in that article was incorrect in as much as the course of the sutures was indicated by solid lines all the way; these lines should be dotted from *A* to *B*, indicating thereby that at that place the threads pass through the aponeurosis and fascia. I therefore beg to reproduce here the illustration in its correct form.

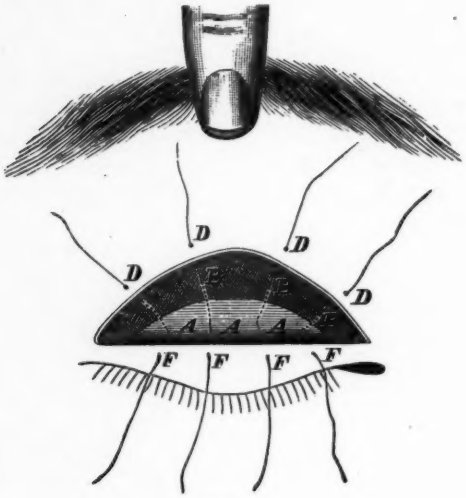

FIG. 2.

On September 16th, the operation was performed in chloroform narcosis. An incision was made through the skin from the inner to the outer canthus; it began at a point 2 *mm.* above the tear-point, and described a curved line with its convexity upward, following the upper border of the tarsal cartilage, and terminated about 2 *mm.* above the outer canthus. The edges of the wound being drawn apart, a narrow strip of the orbicularis muscle, which covered the upper part of the tarsus (*A*, *A*), was taken up with a

forceps and excised with scissors. Thus the aponeurosis of the levator muscle and the fascia tarso-orbitalis (*B*, *B*) were sufficiently exposed to admit of the application of sutures which should bring the skin and cartilage in direct apposition. The sutures included the edges of the skin (*F*, and *D*) and a portion of the aponeurotic fascia (*A*, *B*). Two such sutures were applied in the middle third of the lid. Over both canthi the skin appeared particularly flaccid and elongated; it therefore seemed desirable to create a certain degree of tension by shortening the skin transversely. I therefore removed from the upper border of the wound at each end a triangular piece of skin by running an incision from the angle of the wound perpendicularly upwards, and joining to its upper end a horizontal incision which terminated at the middle third of the upper border of the wound. These lateral portions of the wound were closed by common sutures, which united only the cutaneous borders. But I beg to remark at once that, I have found by further experience the excision of the triangular pieces of skin to be an unnecessary complication of the operation, which can be obviated without injuring the good result of the operation, if deep sutures are substituted for the superficial stitches so that the cutaneous borders in their whole extent are united with the upper margin of the cartilage.

When the patient upon recovering from the narcosis opened her eyes, the fine effect of the operation was so apparent that I put her again under the influence of chloroform and performed the same operation on the right upper eyelid, only that I did not excise any skin, because this had been done sufficiently by the operation in June. Both operations over, the eyes were dressed with cold water compresses.

Sept. 17*th.*—No pain; slight swelling of the lids; the skin of the left upper lid purplish from ecchymoses.

Sept. 18*th.*—Superficial sutures removed.

Sept. 19*th.*—Deep sutures removed; wound healed nicely; no trace of suppuration.

Sept. 28*th.*—The integument is smoothly stretched over the surfaces of both upper lids, and well drawn upwards and backwards when the eyes are open. The ciliary borders are not encumbered by overhanging skin, and the openings of the lids are of normal size. The patient returns home, highly pleased that, as she said, "she looked like herself again."

Nearly a year has passed since I performed this operation, and,

as Dr. Denise has recently advised me by letter, its effect upon the eyelids is still a perfect success.

The advantages which this operation has over the common practice of excising a fold of the integument, are so self-evident that it is unnecessary to enumerate them to the readers of these ARCHIVES. And I would only say that I lay particular stress upon the fact that this operation accomplishes its object completely without in the least mutilating the eyelid; and that by preserving the palpebral skin in its full extent, the appearance and all the movements of the eyelid are perfectly natural. Thus this operation fulfills the highest desiderata of a plastic operation, and for this reason I hope my colleagues will give it a favorable consideration and a fair trial.

APPENDIX.

Sept. 18, 1879.—Mrs. L. has just paid me a visit, and I wish to record the state of her eyelids as found one year after the operation. The left upper lid is perfect in appearance and movement; its tarsal skin is well fastened to the upper border of the tarsus and does not wrinkle or drop down when the eye is opened. The *tarsal* skin of the right upper lid is also smooth and well united with the cartilage. But when the eye is open the *supra-tarsal* skin hangs over the lid as a heavy fold, its lower line being even with the free edge of the lid. This difference in the result, I think, is due to the removal of the original tarsal skin of the right eyelid (by the first operation in June), and practically illustrates the importance of preserving the tarsal integument if we wish to obtain a perfect cosmetic result by our lid operations.

A SYSTEMATIC METHOD FOR THE EDUCATION OF THE COLOR-SENSE IN CHILDREN.

By SWAN M. BURNETT, M.D.,
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IT is pretty well agreed now among those who have been investigating the subject of color-blindness, that there are two forms of defective color-sense, which, though they may merge gradually into each other, are yet, as types, quite distinct. The one is *complete color-blindness*, where the blindness to one or more of the primary colors is complete, and the other is the *diminished chromatic sense*, in which the power of recognizing all or a part of the colors, though not lost, is more or less diminished. The former is, as a rule, congenital and not considered curable by any process of education applied to the individual. We have every right to suppose, however, that an education carried through generations would much ameliorate, if not entirely remove, the defect. One of the strongest arguments in favor of this is that women in whom the sense of color is more continually exercised than in men, are affected with color-blindness in only an insignificant percentage of cases. The diminished chromatic sense, on the other hand, since it is not due to any abnormality in the structure of the color-perceiving apparatus, but to a lack of development of a dormant power, is capable of great improvement in the individual by a right process of instruction.

If these are facts, the great importance of a systematic training of the chromatic sense of children is apparent.

In the course of my examination of the children in the public schools of Washington, I found what I consider an inadequate method employed for this purpose, and in some of the schools I think there is no teaching of the colors at all.

I found the method in common use to be a chart on which the various colors were painted. These colors soon become so faded and dim as to no longer represent what they were originally intended to. And besides, no systematic instruction was given in the comparison of the colors. Since the public school system of Washington is considered among the best in the country, I take it that the same objection would apply to the majority of our schools.

It was for the purpose of remedying this defect that I devised the method soon to be described.

Any plan for the teaching of color to children in schools must first of all be simple and easy. Such instruction is usually confined to the lowest grades where the ages of the children are from six to seven years, and no very complicated method can be understood. The learning of the colors should at the same time be made interesting in order that the children may not look upon it as a task, but rather as a diversion. Each child must be taught separately, though the instruction should be carried on in such a manner that the remainder can also participate in the instruction of the one.

Since the main object is to enable the child to discriminate between the various colors, the method of *comparing* one color with another must be the one employed. But the child should at the same time be taught the names of the colors and shades, for in his descriptions of colors it is important that he be able to convey to others the impression which he has himself received, in language not to be misunderstood.

To fulfill these indications in the simplest and most satisfactory manner there are required:

1.—A set of "sample" colors, with which comparisons are to be made.

2.—A lot of colors from which the pupil is to select colors to be compared with the "sample."

I arrange the "sample" colors in the following way:—

Take a half-sheet of white perforated card-board (42 × 26 *cm.*) with the largest size perforations, and work into it, with Berlin wool, bars 18 *cm.* in length and 35 *cm.* in width, of each of the following colors: red, green, and blue, with a distance of 1.5 *cm.* between them. These should be as pure as possible and represent the three primary colors.*

Then, beginning 3 *cm.* below, work in at the same distances apart each of the following colors of medium shade and as pure as can be got: purple, orange, yellow, pink, brown, and gray. A single skein of Berlin wool is generally enough to work a bar of the required length and width, which is sufficiently large to be seen distinctly across any ordinary school-room by a normal eye. This card is to be placed on a white back-ground on the wall in sight of all the pupils.

The first step in the plan of instruction would be for the teacher to point out the various colors to the whole class and give the names by which they are known, explaining that red, green and blue are the primary colors. Often now each pupil is required to name all the colors when pointed out in the hearing of the whole class. After the pupils shall have been able to name correctly any color pointed out on the card, the teacher will explain to them what a shade is, that it may be lighter or darker than the sample, etc., and taking a package of Berlin wools containing all the shades of the nine colors, will proceed to pick out and exhibit to them all the shades of one of the colors—red, for example. Each of the pupils will then be called upon to pick out the shades in the same way after they have been thoroughly mixed up with the other colors in the pile, arranging them in regular order from darkest to lighest.

The same process must be gone through with the other colors on the card.

From this point the instruction can be carried forward as far as the time and desires of the teacher will allow. If

* I select blue as the third primary color for the practical reason that it would be difficult for children to differentiate between some shades of purple and violet, while blue is quite distinct in all its shades.

necessary, the teacher can go into the various combinations of the different colors, and how the secondary colors are obtained from the primary. This latter would be somewhat difficult, however, since it is only the *spectral* primary colors of red, green and violet which produce the secondary colors. The production of various colors by the mixing of pigments would, however, be very instructive to the older pupils. It would be well also to instruct them in the names, given by convention to certain shades, as "pea-green," "sage-green," "écru," "Bismark brown," "Magenta," etc., etc.

In fact, with this plan, an intelligent teacher will be able to vary the method of instruction in any number of ways.

Nothing specially new is claimed for this plan except, perhaps, making the sample colors of Berlin wool, which, however, seems to me to simplfy the matter wonderfully.* In the first place, no colored paints are so brilliant and pure as the wools; and in the second, the wools are not so quick to fade, and if they do they can be easily replaced. Berlin wool and perforated card-board can be had in any town, or be easily procured from any of the large cities, while the painted or lithographed cards have to be specially made and at a cost which will far exceed the cost of the materials in the plan proposed by me. One half-sheet of card-board costs five cents, the skeins of Berlin wool cost one cent each. Seventy shades will be quite enough for instruction such as we propose, so that seventy-five cents will cover the entire cost of everything necessary to teach colors thoroughly in any school, and the same materials will last for years.

Sept. 25, 1879.

* Dr. Hugo Magnus in his recently proposed plan for the systematic education of the color-sense, uses a chromo-lithographic card with thirty-six different shades and seventy-two colored cards to be used by the pupils in selecting the corresponding colors.

REPORT ON THE PROGRESS OF OPHTHALMOLOGY FOR THE SECOND HALF OF THE YEAR 1878.

(Continued from Volume viii, p. 291.)

By Dr. H. MAGNUS, of Breslau,

and

Dr. A. NIEDEN, of Bochum.

Translated by Dr. R. O. Born, of New York.

ANATOMY, PHYSIOLOGY, AND THERAPEUTICS.

By Dr. H. Magnus, of Breslau.

I.—Anatomy.

NORMAL ANATOMY.

227. Angelucci. Histological examinations of the retinal pigment epithelium of the vertebrates. (*Arch. f. A. u. Phys.*, 1878.) H. 5 u. 6.

228. Couleart Desforges. Anatomie médico-chirurgicale paupière. Paris, 1878.

229. Ditlevsen. On the termination of the sensitive nerves in the cornea. (*Nord. Med. Ark.*, vol. x, 1, No. 5.)

230. Fuchs. On the anatomy of the blood- and lymph-vessels of the eyelids. (*A. f. O.*, Bd. xxiv, 3, and *Centralblatt f. d. Med. Wissensch.*, 1878, No. 28.) The vessels of the lids are arranged in such a manner that disturbance of circulation can arise easily; the curving of the lids in trachoma is chiefly produced by this circumstance.

231. Hensen and Völckers. On the origin of the nerves of accommodation, with remarks on the function of the roots of the oculomotory nerve. (*A. f. O.*, Bd. xxiv, 1, and remarks on this paper by Adamück, *C. f. A.*, 1878, pag. 229.)

232. Horstmann. On the depth of the anterior chamber. (*Ondersæk. gedan in het. physiol. Labor. der Utrecht' schen Hoog-*

school., 1878, and *C. f. A.*, 1878, pag. xlv, and *Z. M.*, 3, *Supplement*, pag. 165.) The average depth of the anterior chamber is 3.19 *mm.*, in emmetropia 3.066 *mm.*, in myopia 3.266 *mm.*, in hypermetropia 3.009 *mm.*

233. HENLE. On the comparative anatomy of the crystalline lens. (*Nachrichten von der Königl. Ges. d. W. zu G.* 1878, No. 6.)

234. KÖNIGSTEIN. On the nerves and blood-vessels of the cornea. (*Wiener Akad. Bericht*, 1878.)

235. KREHBIEL. The muscles of the lachrymal canals and of the eyelids, with special consideration of the conduction of the tears. Stuttgart, 1878.

236. LANGER. On the blood-vessels of the eyelids. (*Wiener Med. Wochenschr.*, 1878, No. 18, and *Stricker's Med. Jahrb.*, H. 2.)

237. LÖWE. Contributions to the anatomy of the eye, with the co-operation of DR. V. KRIES, and the histogenesis of the retina, with comparative remarks on the histogenesis of the central nervous system. (*A. f. micr. An.*, vol. xv, 4.)

238. SCHÖBL. On the blood-vessels of the eye of the cephalopodes. (*A. f. micr. An.*, vol. xv., 2.)

239. STECKER. On the involution of the organs of vision in the arachnides. (*Morphol. Jahrb.*, vol. iv., 4, 2.)

240. STILLING. On a new origin of the optic nerve. (*C. f. d. med. Wissensch.*, 22.) At the base of the crus cerebri there is a nucleus into which fibres of the optic nerve enter.

241. TAFANI. Nuovi studi sulla tessitura intima della retina degli ucelli. Firenze, 1878.

242. WADSWORTH and PUTMAN. Intraocular circulation. (*Journ. of Nerv. and Ment. Dis.*, Octob., 1878.)

PATHOLOGICAL ANATOMY.

243. ALT. Contributions to the pathological anatomy of the eye. (*A. O. O.*, vol. vi, 3–4.)

244. ANGELUCCI. Tuberculosis of the eyeball starting from Fontana's lymph spaces. Tumors of the choroid. (*Z. M.*)

245. BAUMGARTEN. Communications on the histology of the eye. (*A. f. O.*, vol. xxiv, 3.) B. criticises the cases of primary tuberculosis of the conjunctiva which have been published, and comes to the conclusion that its occurrence has been frequently asserted, but not sufficiently proven to refute VIRCHOW's view that the conjunctiva possesses a kind of immunity from tuberculosis.

246. BERLIN. Contributions to the pathological anatomy of the conjunctiva. (*Z. M.*, pag. 342.) On the changes of the conjunctiva in trachoma.

247. BERLIN. On the pathology and anatomy of the lachrymal gland. (*Z. M.*, vol. xvi, *Supplement*, pag. 2, and *C. f. A.*, pag. 2.)

248. BLODGETT. A case of carcinoma conjunctivæ. (*A. f. O.*, vol. xxiv, 3.) Carc. of the conjunct. without participation of the lids; literature.

249. BREITBARTH. Contribution to the knowledge of ectopia pupillæ. (*Inaug. Dissert.*, Giessen, 1878.)

250. EICHHOFF. A case of double-sided coloboma of the inner tunics of the eye without coloboma of the iris. (*Inaug. Dissert.*, Bonn., 1878.

251. FUCHS. On chalazion and some rarer tumors of the lids. (*A. f. O.*, vol. xxiv, 2.) Chalazion develops from an impairment of nutrition of a Meibomian gland; this leads first to a chronic inflammation of the connective tissue around the gland with consecutive small-celled infiltration. By the confluence of several such patches a nodule is formed which consists of granulation-tissue with giant cells. Scrophulosis is, after F., the chief cause.

252. IWANOFF. On the pathological anatomy of trachoma. (*Z. M.*, vol. xvi, *Supplement*, pag. 12, *C. f. A.*, pag. 2.). I found long tubular glands, filled with a finely granulated fatty mass, in the sub-epithelial layer of the conjunctiva, and around them a dense infiltration of lymphoid cells; the same glands occur again in pannus between the epithelium and Bowman's membrane in the newly-formed layer. By transformation of the cells around the excretory ducts into cicatricial tissue the glands are changed into retention-cysts.

253. KLEIN. On a case of persisting pupillary membrane. (*Wien. Med. Presse*, 1878.)

254. VAN DER LAAN. Aniridia congenita dupla. (*Period. de Ophth. Pract.*, vol. i, Nos. 3 and 4.)

255. LARSEN. On the pathological anatomy of glaucoma. (*Hospitals Tidende* 2, vol. v, 15.)

256. MANZ. On albinotic human eyes. (*A. f. O.*, vol. xxiv, 4.) Not the deficiency of the pigment, but the texture of the tissues seems to be the pathological character of albinism. Albinotic eyes are certainly pathological and can never be grouped together with the normal light-colored eyes.

257. MICHEL. On the anatomical causes of changes in the

fundus in some diseases of the general system. (*Deutsch. A. f. Klin. Med.*, vol. xxii, pag. 439.)

258. NIEDEN. Formation of excrescences on the optic disk. (*Z. M.*, vol. xvi, 3, supplement, pag. 194, *C. f. A.*, 1878, pag. 6.)

259. RAAB. On some inflammatory diseases of the eye causing the amaurotic cat's-eye. (*A. f. O.*, vol. xxiv, 3.) There are inflammatory diseases of the eye which clinically cannot be distinguished from the formation of intraocular tumors and which show the picture of the amaurotic cat's-eye.

260. RENSON describes in the *Brit. Med. Journ.*, Sept., 1878, a case of congenital irideremia.

261. SATTLER. On a tuberculous affection of the optic nerve and its sheath, and on retinal tuberculosis. (*A. f. O.*, Bd. xxiv, 3.)

262. SCHOTT. Contributions to the pathological anatomy of the eye. (*A. O. O.*, vol. vii, 2.)

263. SCHUCHARDT. On the pathological anatomy of the capsule after discision. (*Inaug. Dissert.*, Göttingen, 1878.) The capsular scar is formed by proliferation of the capsular epithelium and gradually passes over into a tissue which is similar to the normal capsule. The decayed lens substance is probably absorbed by diffusion and filtration.

264. VOORHIES. Ossification of the crystalline lens. (*A. O. O.*, vi, 228.) In an atrophic eye, which was removed on account of chronic irritation of the ciliary body, the lens was in situ and entirely ossified; in no other part of the eye true ossification could be demonstrated. The possibility of an ossification of the lens, which has thus far been doubted, would be proven by this case, but POTJANS, on the formation of bone in the human eye, (*Inaug. Dis.*, Bonn, 1879) has pointed out that in Voorhies' case there is no statement at all that the ossification really took place in the closed lens-capsule.

265. TAFANI publishes in the *Publ. del R. Institut. Superiore di Studi*, Florence, 1878, studies on the pathological anatomy of the human retina.

II.—PHYSIOLOGY.

CORNEA, IRIS, CILIARY BODY.

266. FUCHS. On the perception of heat by the cornea. (STRICKER, *Med. Jahrb.*, 1878, vol. iv.) The cornea is capable of a specific perception of heat by fibres of the trigeminus.

267. MOLTER. On the relations of the sensibility of the human cornea. (*Z. M.*, Bd. xvi, 2, supplement, *Inaug. Dissert.*, Erlangen, 1878.)

268. ARGYROPULOS. Contributions to the physiology of the pupillary nerves. (*Inaug. Dissert.*, Giessen, 1878.)

269. BADAL. Pupillomètre in: *Études d'optique physiol.* (*A. d'O.*, Tom. 80, pag. 42.)

270. EDGREN. On the movements of the iris in frogs. (*Ups., läk. förh.*, vol. xiii, 3.)

271. FRANCK. Note sur le défaut de subordination des mouvements de la pupille aux modifications vasculaires. (*Progrès. méd.*, No. 32.)

272. FRANCK. De la dissection des filets irido-dilatateurs et des nerfs vasculaires au-dessus du ganglion cervical supérieur. (*Gaz. Méd.*, No. 31.)

273. HURWITZ. On reflex-dilatation of the pupil. (*Inaug. Dissert.*, Erlangen, 1878.)

274. KATYSCHEW. On the electric irritation of the sympathetic fibres, and on the influence of electric heat on the pupil of man. (*Arch. f. Psych.*, vol. vii, 2.)

275. NACHTEL. Dilitation de la pupille. (*Progrès. Méd.*, No. 24.)

276. PICARD. On the movements of the pupil. (*Gaz. des. Hop.*, No. 93.)

277. BOUCHARD. Contribution à l' étude de l' accommodation de l' œil. (*Rec. de Mém. de Méd.*, 1878, July, August.)

278. HOCK. Action of the meridional fibres of the ciliary muscle. (*Centralbl. f. d. Med. Wissensch.*, No. 43.)

279. ROSSET has published in the *Amer. Journ.*, October, 1878, researches on the muscle of accommodation and the mode of its action. *Cf.* also No. 231 of this bibliogr.

REFRACTING MEDIA, RETINA, OPTIC NERVE AND CENTRAL ORGAN, PHYSIOL. OPTICS AND COLOR-SENSE.

280. CHABBAS. On the secretion of the aqueous humor in relation to the causes of the formation of lymph. (*Inaug. Dissert.* Königsberg, 1878, cf. No. 63 of this bibl.)

281. KLUG, Researches on the diathermania of the media of the eye. (*Arch. f. Anat. u. Phys.*, 1878, Heft 3 u. 4.) The dark caloric rays pass the more easily through the vitreous the more

intense the source of heat and the nearer the rays are to the spectral red.

282. KNIES. On the nutrition of the eye and the avenues of exit of the intraocular humors. (*A. O. O.*, vol. vii, 2–4.) As the principal place of secretion of the intraocular fluid we have to regard the choriocapillary layer of the uveal tract; there the fluid passes outward toward the suprachoroidal space as well as inward through the retina into the vitreous. The fluid which passes outward is carried off partly through the vaginal space of the optic nerve, partly into the space of *Tenon's* capsule. The fluid which enters the vitreous passes through the lens and zonula Zinnii into the anterior chamber, and there forms, together with the fluids secreted by the iris, the aqueous humor; the greater portion of this leaves the anterior chamber through *Fontana's* spaces. From there a part of the fluid follows the interfasicular spaces of the sclerotic, and gradually enters the space of *Tenon's* capsule and the optic nerve sheath. The connective tissue portion of the orbital tissue within the muscular funnel then like a a sponge sucks up the fluid. The orbital connective tissue seems to play the part of lymph. glands. The fluid coming from the retina does not change this current.

283. GIRAUD-TEULON. Fixation des images sur la rétine et pourpre rétinien. (*Bull. de l' Acad. d. Méd.*, 1878, No. 32, et *Arch. génér.*, 1878, Octob.

284. HIRSCHBERG. On the graphic demonstration of the retinal function; lecture delivered May 17, 1878, in the Phys.-Ges. z. Berlin. (*Verh. d. phys. Ges.*, No. 12.)

285. HJORT publishes in the *Norsk. Mag.*, vol. viii, pag. 205, communications on the *visual purple.*

286. HOLMGREN. On the visual purple and retinal currents. (*Unters. d. phys. Inst. d. Univers. Heidelberg*, vol. ii. h. 1.) The variations of the retinal current are in no essential relation to the phenomena of bleaching and regeneration of the visual purple; the visual purple is therefore of no special importance for vision.

287. KÜHNE. Observations on blindness by pressure in the fresh human retina; continued examination on the retina. (*Unters. aus. d. phys. Instit. d. Univ. Heidelberg*, vol. ii, h. 1.)

282, PUGLIA. Sulla porpora visuale osservazioni sperimentali e note. (*An. d. Ottal.* vii.)

289. TIXIER (*Bull. de l'Acad.*, 1878, August.) On fixation of pictures upon the retina.

290. BRÜCKE. On some sensations in the optic nerve. (*Sitzungsber. d. K. Acad. d. Wissensch.*, Bd. lxxvii, Abth. 3.)

290 a. FÜRSTNER. Further communications on a peculiar disturbance of vision in paralytic patients. (*Arch. f. Psych.*, ix, 1). In disease of the cortex cerebri disturbances of vision were observed in one eye which were not of a hemiopic character, and which seem to be analogous to the mental blindness of *Munk;* on cases cf. *ibid., Reinhard.*

291. LAFFORGUE. Etude sur les rapports des lésions de la couche optique avec hémianésthésie d' origine cérébrale. Paris, 1878.

292. MÜLLER. Neuropathological studies. (*Berliner klin. Wochensch.*, 1878, No. 21.) On the terminations and the course of the fibres of the optic nerve in the brain, and their value for the explanation of certain cases of one-sided amblyopia.

293. MUSEHOLD. Experimental researches on the visual centre of the pigeon. (*Inaug. Dissert.* Berlin, 1878.) If portions of the anterior half of the hemispheres were removed with a sharp spoon, no consequences were noticed ; removal of larger or smaller portions of the posterior half caused always visual disturbances of the opposite side, but always restitution followed, which, however, was not the result of a vicarious action of the healthy hemisphere, but the parts of the posterior half of the hemisphere surrounding the loss of substance learned to perform the function which had been lost by the extirpation.

294. VETTER. The recent experiments on the cerebrum, and the clinical results in diseases of the cortex cerebri in man. (*Deutsches Arch. f. clin. Med.*, pag. 403.)

295. SCHMIDT-RIMPLER. Delirium from closure of the eye and darkness of the room. (*Arch f. Psych.*, ix, 2.) By the closure of the eye and deprivation of light, delirium occurs, which can etiologically not be put into the formerly known categories, especially the delirium potatorum or the delirium traumaticum.

296. BADAL. Etudes d' optique physiologique. (*A. d' O.*, 11 série, T. x.)

297. HELMHOLTZ. On the importance of the convergence of the eyes for the determination of the distance of objects seen with both eyes. (*Arch. f. Anat. u. Phys.*, H. 3 u. 4.)

298. HORNER. Slate-pencil, lead-pencil and pen as writing utensils in primary schools. (*Deutsche Vierteljahrschr. f. öffensl. Gesundheitspflege*,, h. 4, 2 Hälfte.) He arrives at the following

conclusions: 1. Equally large and in every respect comparable letters must, if written with slate-pencil, in order to be recognized, be brought nearer by a fraction of the measure (foot, meter, etc., according to the size of the letter or the visual angle) than if written with ink on paper. 2. In letters of equal size the retinal image must be one-fifth larger in order to recognize letters written with lead-pencil. 3. The hygiene of the eye requires therefore the removal of the slate-board and pencil from the school, and puts pen and ink in its place. Here may be remarked, at the same time, that at the last meeting of the Russian society for hygiene *Malarevsky* proposed to print the books white on black instead of black on white as usual. Cf. also: *The nature*, 1879, 17 April, pag. 561.

299. JAVAL. Essay sur la physiologie de la lecture. (*A. d' O.*, 11 série, T. x.)

300. v. KRIES. Contention (wettstreit) of the visual directions in divergent squint. (*A. f. O.*, vol. xxiv, 4.)

301. LOISEAU. Optomètre métrique et phakomètre. *A. d' O.*, 11. série, T. x., and optomètre ophthalmoscopique au moyen de l' image renversée. L. declares *Schmidt-Rimpler's* determination of refraction to be excellent, and tries to complete it.

302. SCHMIDT-RIMPLER. On the objective measurement of refraction, with an addition of Hirschberg, who prefers the erect image. (*C. f. A.*, 1878, Novemb., and *Tageblatt d.* 51. *Versamml. Deutscher Naturf.*, No. 3, pag. 64.)

303. SCHÖN. On the doctrine of binocular vision. (*A. f. O.*, vol. xxiv, 4.)

304. ALLEN. The color-sense. London, 1878. Against the development of the color-sense.

305. CLASSEN. Sketch of a physiology of the light and color perception. Preyer, Samml, phys. Abhandl., 2 Reihe, 2. Heft, lays special stress upon the philosophical part of the question.

306. CHARPENTIER. Les sensations lumineuses et les sensations chromatiques. *Arch. génér.*, 1878, July, pag. 118.

307. DELBOEUF. Rapport sur les questions relatives au daltonisme intéressant les administrations du chemin du fer. (Acad. Roy. de Belg. *Extrait du Bullet.*, 2 série, T. xlv, No. 4.)

308. DONDERS. La détermination numérique du pouvoir de distinguer les couleurs. (*A. d' O.*, 11. série, T. 9, cf. the report of the 10. meeting of the ophth. society, Z. M. xv, supplement, pag. 182.)

309. Dor. De l' evolution historique du sens des couleurs. Nov. 19, 1878, *Dor* presented to the academy at Lyons his paper against the development of the color-sense. Appeared as a pamphlet.

310. Favre. Daltonisme. (*Arch. génér.*, 1878.)

311. Fick. A notice on color perception. (*Arch. f. Phys.*, vol. xvii.) Colored objects appearing under a very small visual angle do not cause an impression of color, but only an impression of light; but if several of them are brought before the eye, the color is at once perceived by the sum of the impressions.

312. Häckel. Origin and development of the visual organs. (Kosmos. 1878, November.) He is inclined to adopt a gradual development of the color-sense.

313. Holmgren. Color-blindness in its relation to accidents by rail and sea. (Washington, 1878.) The English translation was made at the order of the Smithsonian Institute.

314. Jeffries. Relative frequency of color-blindness in males and females. (*Boston Med. a. Surgical Journal*, 1878, July.) After the latest news in the *Boston Evening Transcript*, April, 1879, J. found among 9,303 schoolboys 361 color-blind, = 3.88 per cent., and among 5,429 girls only 2 color-blind, = 0.036 per cent. He calls attention to the necessity of cultivating the color-sense in schools.

315. Kittao. On color-sense. (*Inaug. Dissert.* Göttingen, 1878.)

316. v. Kries. Contribution to the physiology of the perceptions of sight. (*Arch. f. Anat. u. Phys.*, 1878.) Upon experimental experience K. militates for the *Young-Helmholtz* theory.

317. Magnus. Contributions to the knowledge of the physiological color-blindness. (*A. f. O.*, vol. xxiv, 4, and on the development of the color-sense, with a postscript of *Zehender*, Z. M.)

318. Pole. Color-blindness in relation to the Homeric expressions of colors. (*Nature*, 1878, Oct.) *Pole*, who is color-blind himself, criticises the Homeric expressions of colors, and comes to the conclusion that either the author must have been color-blind, or that the state of the color-sense at that time was rudimentary.

319. Stilling. On color-sense and color-blindness. Lecture delivered at the 51st meeting of the German Natural Philosophers. Cassel, 1878.

319 a. H. Cohn. On Color-blindness. (*Ibidem.*)

III—Therapeutics.

Medicamental Therapeutics.

Atropine, Duboisine, Eserine.

320. Alexandroff. De l' action mydriatique de la duboisine. *Journ. de Thér.*, vol. v, vii.

321. Benton has cured an idiopathic mydriasis with eserine. (*Brit. Med. Journ.*, 1851, July ; also *Morton.*)

322. Fonseca. (*Périod. Ophthalm.*, 1878.) Prolapse of iris cured with eserine.

323. Gotti treats phlegmonous keratitis with eserine. (*Riv. Clin.*, vol. viii, 10.)

324. Galezowski. Danger des instillations d' atropine. (*Soc. de Biol.*, Nov. 16, 1878.)

325, Holmes and Gerard. La duboisia et son alcaloïde. (*Bull. de Thérap.*, vol. xciv.)

326. Jany. Contributions to the therapeutics of glaucoma. (*Deutsche Med. Wochenschr.*, No. 48 u. 49.) Favorable action of eserine.

327. Knapp. Some observations and remarks on the action of eserine in glaucoma. (*A. O. O.*, vol. vii, 1.) K. comes to the following conclusions: 1. In acute glaucoma the cure is exceptionally permanent, but there is always a transient improvement by which the patient is advantageously prepared for the operation. 2. In subacute glaucoma its benefit is doubtful. 3. In chronic glaucoma eserine is ineffectual or even injurious.

328. Keiser. On the physiological action of belladonna and atropine upon the eye. (*Phila. Med. and Surg. Rep.*. July.)

329. Landesberg. On the therapeutic use of calabar and eserine in eye diseases. (*Phila. Med. Times*, vol. ix, No. 285.)

330. Marmé. On duboisia myoporoides. (*Nachrichten von der Königl. Ges. d. Wissensch. a. d. G. A. Universitæt zu Göttingen*, 1878, No. 12.)

331. Morano recommends eserine in purulent corneal and conjunctival inflammation. (*G. O.*, 1878, Novemb. and Decemb.)

332. Scellingo. Contribuzione all' uso terapeutico dell' Eserina nelle malattie oculari. Roma, 1878.

333. Skopcynski. On Duboisine. (*Apotheker-Zeitung*, No. 32.)

334. Vidor. The use of eserine and atropine in ophthalmology.

(*Jahrb. f. Kinderheilkunde*, vol. xii, 4, and *Pesther Med. Chir. Presse*, vol. xiv, 21.)

Jaborandi, Iodoform, Pilocarpine, Strychnine.

335. Tonoli reports in *Gaz. Lomb.*, vol. v, pag. 7, on myosis and mydriasis produced by Jaborandi.

336. Hayes. Iodoform in eye-diseases. (*Med. Times and Gaz.*,, 1468.) One part of iodoform with four parts of vaseline in chronic diseases of the lids and conjunctiva.

337. Landesberg. Contribution to the therapeutical use of iodoform. (*Phila. Med. and Surg. Rep.*, 39, No. 18.)

338. Ravà. Sulle applicazioni dello jodoformo alla terapia oculare. (*A. d' Ott.*, 7.)

339. Béranger. Du chlorhydrate de pilocarpine, son action et ses indications dans la thérapeutique des affections oculaires. Paris, 1878.

340. Fuchs. On the use of pilocarpine in eye-diseases. (*Wiener Med Wochenschr*,, Nos. 37 and 38.) Subcutaneous injections proved effective in inflammatory processes of the choroid and iris.

341. Gillet de Grandmont. De l' action phys. du nitrate de pilocarpine et des effets thérapeut. dans les affections oculaires. (*Franc. Méd.*, Nos. 65–73.) It promises therapeutical results in iritis; in certain forms of keratitis; in affections of the vitreous; in glaucoma, choroiditis, retinitis, detachment of the retina and especially in atrophy of the optic nerve.

342. Rampoldi. Della pilocarpina formo alla therapia oculare. (*A d' Ott.*, T. vii.)

343. Coumétou. Contribution à l' étude de la strychnine en thérapeutique oculaire. Paris, 1878.

344. Galezowski. De l' action physiologique et thérap. de la strychnine sur l' œil. (*R. d' O.*, 1878, July.)

Diversa.

345. Emmert recommends instead of copper the crystal stick of alum. (*Correspondenzbl. f. Schweiz. Ærzte*, 1878, Nov., Cf. Magnus *Deutsche Med. Wochenschrift*, 1876, No. 37, and *Breslauer ärztl. Zeit.*, 1879, Mo. 7.)

346. Gosselin. De la conjonctivite purulente et de son traitement par l' alcool. (*R. d' O.*, 1878.)

347. Keppler. The acute saponine-poisoning. (*Berl. Klin.*

Wochenschr., 1878, No. 33.) Saponine-injections produce exophthalmus and myosis.

348. LANDESBERG. On the use of hydrargyrum oleatum in ophthalmic surgery. (*Z. M.*, 1878, pag. 393); preferable to Hydrarg. oxid. rubr.

349. PICHA. The treatment of inflammations of the eye. (*Militärarzt*, No. 12.)

350. PICK. Method of allaying the pain of the conjunctiva quickly after the touching with sulphate of copper. (*Centralbl. f. Med. Wissensch.*, No. 45.) Dusting in of calomel is said to subdue the pain caused by the copper. At the beginning calomel should be applied a few minutes after the touching, after a few days however immediately after the use of the pencil.

351. PLANAT recommends *ergotine* 0.5 : 20.0 against *keratitis* and *iritis*. (*Journ. de Thér.*, 1878, Octob.)

352. ROUIRE. De l' atrophie papillaire tabétique et de son traitement. Paris, 1878.

353. ROY treats *blepharitis ciliaris* by the application of a piece of *vulcanized caoutchouc*. (*Bull. de Thér.*, 1878, August.)

354. RUVIOLI. Dell efficacia del bromuro di potassio nelle ambliopie e amaurosi dei bevitori. (*A. d' Ott.*, vol. vii.)

355. SCHMID. On the treatment of syphilitic eye-affections with subcutaneous injections of mercury. (*C. f. A.*, 1878, December.)

356. SEELY. Ocular therapeutics. (*Cincinnati Lancet*, 1878, No. 25.)

357. SETTLER. On the treatment of diphtheritic conjunctivitis. (*Inaug. Dissert.*, Greifswald, 1878); he recommends Ungt. hydrarg. lutei.

PHYSICAL THERAPEUTICS.

Electrotherapeutics.

358. BOUCHERON. Étude phys. et emploi de l' électricité dans la thérapeutique oculaire. Paris, 1878.

359. CHERMES. De l' action de la glace, de l' eau glacée, des douches froides, des métaux, du magnétisme et de l' électricité sur l' achromatopsie et hémianesthésie hystérique. (*Franc. Med.*, 1878, August, September.)

360. TAYLOR treats some cases of *amaurosis* with *electricity*. (*Brit. Med. Journ.*, 1878.)

Metalloscopy.

361. ABADIE. De quelques troubles oculaires nerveux de nature hystérique et de leur traitement par la métallothérapie. (*Progrès. Méd.*, 1878, July.)

362. BURG has cured *hysterical ophthalmia* by *metalloscopy*. (*Gaz. Méd. de Paris*, 1878, December.)

363. VIGOUREUX. Sur un nouveau procédé de métallothérapie externe. (*Progrès. Méd.*, 1878, July.)

364. WESTPHAL. On metalloscopy. (*Berl. Klin. Wochenschr.*, No. 30, with notes of *Schweigger* and *Hirschberg*.)

Actual Cautery.

365. ANDRAW speaks in the *Brit. Med. Journ.*, Septemb., 1878, of the application of the cautery in eye-diseases.

366. MARTINACHE. De l'emploi du cautère actuel dans les maladies des yeux, et principalement dans les ulcères de la cornée. (*A. d' O.*, 11 serie, T. x.) He recommends the cautery in ulcerous corneal processes, in blepharitis, chronic conjunctivitis, etc.

367. ROUTIER ET ARNOZAN. De la cautérisation linéaire de la paupière contre le blépharospasme et l'entropion. (*France Méd.*, Nos. 19–20.)

Diversa.

368. BUZZARD has cured blepharospasm permanently by the removal of impacted ear-wax from the outer canal. (*Brit. Med. Journ.*, pag. 733.) He reminds of a case of reflex-dysphagia, which *Ruff* cured by removing impacted cerumen from the ear. (*Monatschr. f. Ohrenheilk.*, 1878, No. 12.)

369. GEROLD. Ophthalmological clinical studies. (3, *Folge*. Bernburg, 1878.) He speaks of the therapeutical value of colored light.

370. HODGES recommends compressive bandage in corneal ulcer with hypopyon. (*Brit. Med. Journ.*, 1878, September.)

371. H. PAGENSTECHER. On the massage of the eye and its application in different eye-diseases. (*C. f. A.*, 1878, December.)

372. LEE recommends hydrotherapeutics together with tinct. veratri for Basedow's disease; also *Thermes* has seen good results from the hydrotherapeutics. (*France Méd.*, 1878, Nos. 81 and 83.)

373. THERMES. Des effets de l'excitant thermique (chaleur ou froid) sur l'anesthésie, l'achromatopsie des hystériques. (*Gaz. Méd.*, No. 46.)

OPERATIVE THERAPEUTICS.

Iridectomy and Sclerotomy.

(*Cf. No.* 115–118 *of this bibl.*)

374. HOCK. Eight sclerotomies after v. Wecker—Mauthner's method. (*A. A. O.* Bd. vii.) He wants to make the sclerotomy with two lance-shaped knives provided with stops.

375. KUHN. Iridectomy and its curative effect in glaucoma. Eichstädt, 1878.

376. PEYROT. Sur la valeur thérapeutique et opératoire de l'iridectomie. Paris, 1878.

377. PLENK. On some sclerotomies for glaucoma. (*A. A. O.* Bd. vii.)

378. PROUFF. Pathogénie du glaucome, suivie, de quelques mots sur le traitement. Paris, 1878.

379. STEINHEIM. On iridectomy, with a recommendation of Sichel's knife. (*Tageblatt der* 51. *Vers. Deutsch. Naturf.*, No. 6, pag. 167.)

Cataract-Operations.

380. EMMERT. On a method of cataract operation. (*Corr.-Blatt. f. Schweizer Ærzte*, vol. viii.)

381. GIRAUD-TEULON. Sur un nouveau procédé d'extraction de la cataracte. Presented to the Surgical Society of Paris on August 27, 1878, in the name of *Dr. Vibert.*

382. GRÜNING. On peripheral division of the capsule in Morgagnian cataract. (*A. O. O.*, vol. viii.)

383. DEL MONTE. Settanta estrazioni di cateratta dura col processo lineare modificato di v. Gräfe. (*A. d' Ott.*, vol. vii.)

384. MORANO. 40 operazioni di cateratta dura col processo della estrazione lineare modificato. (*G. O.*, Fasc. 9 and 10.)

385. VELARDI. Intorno al metodo di estrazioni lineare esterna semplice o combinata del Prof. Castorani. (*G. O*, Fasc. 9 and 10.)

Treatment of Detachment of the Retina.

386. HOCK. The therapeutics of detachment of the retina. (*Wiener Med. Blätter*, Nos. 13 and 14.)

387. MORANO. Storia di un caso di distacco retinico felicimento guarito. (*G. O.*, Fasc. 5 and 6.)

388. WOLFE. A new operation for the cure of detachment of the retina. (*The Lancet*, 1878, No. 15.) The scleral puncture

recommended by *v. Gräfe*. *Brailey* protests in *Lancet*, No. 21, against the assertion of *Wolfe* that this operation is new, and *Wolfe* has answered again in *Lancet*, No. 23.

Squint Operation.

389. ADAMS, in *Lancet*, 1878, August, sets up the following principles for squint operations: if one-sided squint is developed during the first year, immediate operation is indicated; in squint which is developed later in consequence of hyperopia, the operation should be deferred, spectacles should be prescribed, and the squinting eye systematically practised.

390. BOUCHERON. Nouveau procédé de strabotomie. (*Gaz. Méd.*, No 35, and *Progr. Méd.*, 1878, July.) B. lays especial stress upon the complete division of the lateral attachments of the muscle.

391. GRAND-CLÉMENT. Modification au manuel opératoire de la strabotomie dans le strabisme interne. (*Lyon. Méd.*, 1878, July.) The tendon of the external rectus should be shortened according to the amount of deviation, without operation on the internal rectus muscle. (The author calls this procedure strabotomy by resection of the externus.)

Diversa.

392. ADAMÜCK. On the therapeutics of episcleritis. (*C. f. A.*, September.) Deep incisions into the inflamed tissue.

392a. BERNAUER. De l'hypopion et de son traitement Paris, 1878.

393. BEHRING. New observations on neurotomia optico-ciliaris. (*Inaug. Dissert.*, Berlin, 1878.)

394. GAYET. Nouvelle procédé opér. de l'entropion. Paris, 1878.

395. HUDSON declares *Saemisch's* keratotomy to be the best method of treatment in torpid corneal ulcers. (*Brit. Med. Journ.*, 1878, September.)

396. IMRE. On the treatment of hæmorrhages into the anterior chamber. (*Berlin. Klin. Wochenschrift*, Nos. 40 and 41.) Removal by paracentesis.

397. KREBS. On the healing of perforating scleral wounds with or without conjunctival flap, after experiments on the rabbit. (*Inaug. Dissert.*, Berlin, 1878.)

398. PANAS treats keratoconus by removing a flap from the cornea. (*Gaz. Méd.*, 1878, July 22d.)

399. SABADINI. Contribution à l'étude pathogénique et au traitement des tumeurs et des fistules du sac lacrymal. Paris, 1878.

400. THEOBALD. Further testimony in favor of the use of large probes in the treatment of strictures of the nasal duct. (*A. O. O.*, vol. vii.)

(The fourth and fifth parts of this report will appear in the last number.)